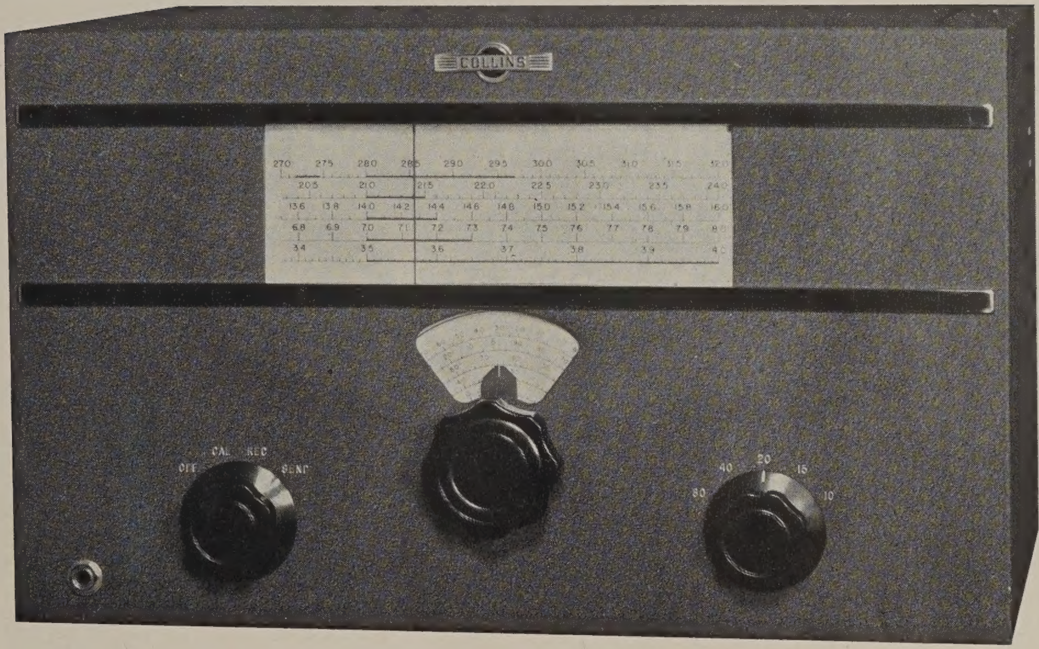
COLLINS 310A
exciter unit



The exciter unit for the 30K has a self-contained power supply, a v.f.o., and an r-f output of 10 watts. All circuits are ganged together and controlled by a single tuning knob. The permeability tuned oscillator is a peacetime application of a rugged and highly stable wartime development. The dial is calibrated directly in frequency, and is accurate to within 1 kc in the 40 meter band. Accuracy on the other bands is directly proportional. The 1 kc allowable deviation includes the frequency error due to all normal changes in operating conditions. The PTO (permeability tuned oscillator) operates in the 160 meter band. Output tube in the exciter is an 807 which is used as a doubler on all bands except 80 meters.

One control bandswitches all circuits simultaneously. The exciter covers the 80, 40, 20, 15, 11, and 10 meter bands. The send-receive switch has four positions—Off, Calibrate, Receive, and Send. In the Calibrate position, the exciter can be tuned to zero beat with a received signal without turning on the transmitter. This switch has extra sections which can be used to operate a transmitter relay and disable a receiver in the Send position.

Cathode keying provides fast, clean CW operation. When the key is removed from the jack, the circuit is automatically closed for phone operation. The exciter output is fed through a 73 ohm coaxial transmission line to a link on the grid coil in the transmitter.

Operation of the exciter is extremely simple—one control switch, a bandswitch, and a single dial tuning. Frequency control is rapid, accurate, and reliable.

Tube Lineup:	1—6SJ7 PTO
	1—6AG7 buffer amplifier
	1—6AG7 doubler
	1—807 multiplier
	1—807 output
	2—VR105 voltage regulators
	1—5R4GY rectifier
	1—6X5 bias rectifier

Dimensions: 17¼" w, 10½" h, 12½" d.

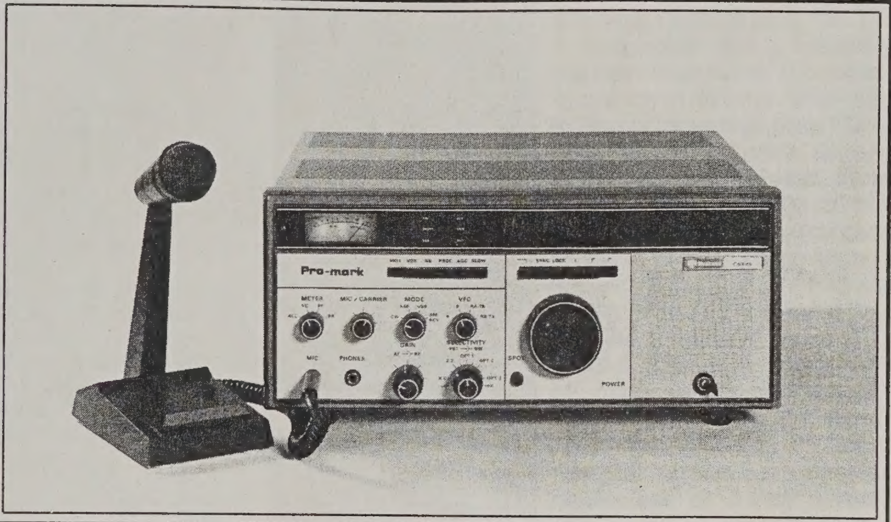
Power Source: 115 v. a-c, 50/60 cps.

CQ Reviews: The Rockwell-Collins KWM-380 Transceiver

BY JOHN J. SCHULTZ*, W4FA

The Rockwell/Collins advertisements for the KWM-380 contain a nostalgic scene with some S-Line gear. It makes for a nice advertisement display, but no one should imagine that the KWM-380 has anything in common with the old S-Line gear except a bit of nostalgia. The KWM-380 is a completely new transceiver concept from the ground up.

The KWM-380 h.f. transceiver makes quite an impression when one first receives it as I did in a rather huge package. Unpacking it, one finds a unit that measures about 16″ × 18″ × 7″ and weighs in at almost 50 lbs. For its power class as a nominal 100 watt output transceiver, it is several times larger and/or heavier than quite a few transceivers on the market, although one should note that it is a complete station package. That is, it contains a speaker, power supply, the equivalent of a second v.f.o., and space for a host of accessory items, such as a unique type of new speech processor. The space and weight involved is not wasted. The transceiver is filled with circuitry and interesting features, as it should be for its price class.



The clean front-panel layout of the KWM-380 rather belies the extremely sophisticated operating features contained in the unit. It covers all the amateur bands on transceive and 1.8 to 30.0 MHz on general-coverage receive, but where is the bandswitch?

Taking a look at the transceiver's condensed specifications as shown in Table I, one can see some interesting features. The transceiver basically covers the 1.8 to 30 MHz range[1] in 10 Hz steps with a four-speed tuning capability on receive and nominally only the 160–10 meter amateur bands on transmit. WARC bands are provided for by a simple modification. The receive coverage is not specified in terms of "bands," because from an operating viewpoint they do not exist. The tuning coverage is truly continuous, in that, as described later in more detail, one simply rotates the tuning knob to go from 1.8 to 30 MHz. There is no bandswitch nor any receive or transmit tuning controls other than the main tuning knob.

The rest of the specifications call for very "tight" frequency readout accuracy and stability, a nominal 100 watt output, very good unwanted signal suppression values on transmit, and an exceptional combination of good receive sensitivity with a +15 dBm third-order intercept point. Just reading through the specifications, one senses that the KWM-380 should be an exceptional transceiver. The physical impact of the KWM-380 only serves to enforce this expectation—not because of its weight, but because of its exceptionally "clean" panel layout and extremely clear and large digital frequency display.

As it turns out, the KWM-380 is an exceptional piece of equipment. Someone such as myself who enjoys understanding and writing about circuitry detail could probably generate several volumes on the KWM-380. However, I'll try to resist over-indulgence in that aspect of things in favor of giving you a general description of the electrical concept of the KWM-380, while highlighting a few specific circuits, some comments on the KWM-380's physical make-up, results of test measurements, operating impressions, and finally, details on a few of the most interesting accessories available for the KWM-380.

Circuitry

Fig. 1 shows an overall block diagram of the KWM-380. The receive and transmit signal chains do utilize some common circuits, but if one notes the arrows on the diagram for their signal flow, one can separate them fairly well. For instance, the receive signal path starting at the antenna (upper left corner) goes through a low-pass filter and a.g.c. blocks to a first mixer stage. This mixer stage receives local frequency injection in the range of 39.145.00 to 69.144.99 MHz from a synthesizer block and produces the first i.f. output at 39.145 MHz. The 39.145 MHz i.f. signal goes through a broad 4-pole crystal filter and on to the second mixer, which produces the second i.f. frequency of 455 kHz. The i.f. frequency is translated to 6.255 MHz in a passband tuning circuit and then retranslated back to 455 kHz. The final 455 kHz signal is routed through a product detector for s.s.b./c.w. or to an a.m. detector and then on to a c.w. audio filter and the a.f. amplifier stages.

The transmit signal path starts with a balanced modulator at 455 kHz (upper right of fig. 1), goes through the sideband filter associated with the 6.255 MHz passband tuning circuit, is retranslated to 455 kHz, then is up-converted to the 39.145 MHz i.f., and finally is translated in the same mixer which handles the incoming receive frequency to the output frequency.

All of the frequency conversions used in the KWM-380 may seem a bit confusing, but they are designed to accomplish

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**c/o CQ Magazine*

[1] *The synthesizer range actually covers 0–30 MHz. The Collins specified operating range is 1.8–30 MHz.*

Parameter	Specifications
Physical	
Size	394 mm (15.5 in.) wide; 190 mm (7.5 in.) high, including 25 mm (1 in.) feet; 457 mm (18.0 in.) deep
Weight	27.2 kg (50 lb.), max
Environmental	
Operating temperature	0 to 50 °C (32 to 122 °F)
Operating humidity	0 to 90% relative humidity
Operating altitude	0 to 3049 m (0 to 10,000 ft.)
Vibration	2 g's, 10 to 33 Hz
Electrical	
Primary power	Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ± 5%, 50 to 60 Hz; or 12 to 15 V dc, negative ground: 120 watts max in receive, 600 watts max in transmit
Receiver	
Frequency	0.5 to 30.0 MHz, tunable in 10 Hz steps
Modes	u.s.b., l.s.b., a.m., and c.w.
Sensitivity (Using "soft μV measurement)	0.5 μV or better for 10 dB (s + n)/n, 2.0 to 30.0 MHz, s.s.b. and c.w.; 1.0 μV or better for 1.8 to 2.0 MHz.
Selectivity (3 dB bandwidth)	Selectable: 8 kHz *1.7 kHz *6 kHz *360 Hz 2.1 kHz *140 Hz **Optional Filters*
I.f. and image rejection	Greater than 60 dB
Intermodulation distortion	− 50 dB or better for two signals of − 10 dB mW each, 20 kHz apart
AGC	Audio output variation not more than 8 dB for 4 μV to 200 mV open circuit r.f. input variation
Audio output	Not less than 3 W into 4 ohm load, at 1 kHz, at not more than 10% total harmonic distortion Line audio output not less than − 10 dB mW nominal into 600 ohms Frequency response: 300 to 2400 Hz with not more than 5 dB variation
Transmitter	
Frequency	160 through 10 m amateur bands, tunable in 10 Hz steps 160 m 1.800 to 2.000 MHz 80/75 m 3.500 to 4.000 MHz 40 m 7.000 to 7.300 MHz 20 m 14.000 to 14.350 MHz 15 m 21.000 to 21.450 MHz 10 m 28.000 to 29.700 MHz
Modes	u.s.b., l.s.b., and c.w. (RTTY by AFSK on l.s.b.)
Output power	90 W pep, min (100 W, nominal) In c.w. or RTTY: 50% duty cycle; key down 15 minutes, max. Automatic turndown to 50 W after 10 seconds. With optional blower kit installed, power is 100 W average, 50% duty cycle, key down 1 hour max at 25 °C; 30 minutes max at 50° C for all modes.
Unwanted signal suppression	
Carrier	− 50 dB or better
Undesired sideband, 1 kHz ref	− 55 dB or better
Harmonics (all)	− 40 dB or better
Mixer products	− 50 dB or better
Third order distortion	25 dB below each tone of 2-tone test
Synthesizer accuracy and stability	Accuracy within ± 5 Hz after 10 minutes warmup when 39.6 MHz and 455 kHz oscillators are set to within ± 3 Hz. Stability within ± 150 Hz over temperature range of 0 to 50 °C (32 to 122 °F) if oscillator's set within 10 Hz at 25 °C (77 °F)
Antenna impedance	50 ohms, nonreactive. (Full transmitter power output with v.s.w.r. of 2:1 or less. Automatic power output turndown with v.s.w.r. greater than 2:1.)
Audio inputs	
Microphone	Low or high impedance, dynamic; 3.3 kΩ nominal impedance
Line	600 ohm, unbalanced; 40 mV input sufficient for full r.f. power output

Table I– Manufacturer's specifications.

various specific functions. An examination of slightly more detailed receive and transmit signal path block diagrams should help to clarify the situation.

For instance, fig. 2 shows details of the receive signal path. The "front-end" of the KWM-380 is unique in several respects. There is no r.f. amplifier stage, and there are none of the usual bandpass filters as are usually associated even with transceivers having a "high" first i.f. (above 30 MHz). The filter blocks that an incoming signal goes through before being amplified are not quite what one would expect. The first filter block is a 0.5–1.6 MHz rolloff one, simply designed to protect the transceiver from BC band overload. The high-pass filter block works in conjunction with a following 30 MHz low-pass filter block. The latter is fixed in frequency at 30 MHz, while there is a selection of three high-pass filter cutoffs of about 20, 14, or 7 MHz. So, an incoming signal can be "bracketed" between 7–30 MHz, 14–30 MHz, or 20–30 MHz.

The reason for this arrangement is not simply to provide image signal rejection; the very high first i.f. frequency takes care of that. The high-pass filters ensure that the transceiver does not generate second order intermodulation products of commercial/broadcasting stations. For instance, in the European area the "breakthrough" of 13–15 MHz signals on "simple" transceivers operating on 10 meters can be a very severe problem. The problem doesn't exist with the KWM-380. In between the high- and low-pass filter blocks one can see a PIN diode attenuator (CR104). This diode is controlled by a voltage from a.g.c. amplifiers in the KWM-380. Essentially, the diode performs the same function in an automatic fashion as the manual r.f. attenuator switches one finds on many h.f. transceivers.

The 39.145 MHz i.f. signal is produced by the first "U100" mixer. This i.f. signal is amplified, passes through an optional noise blanker unit, and then goes on to mixer "U102," where the i.f. signal is translated to 455 kHz and routed to a passband tuning assembly. An up/down frequency translation takes place in this assembly in that the 455 kHz i.f. is translated to an i.f. of 6.255 MHz and then back down again to 455 kHz. True signal selectivity takes place in crystal filters associated with the 6.255 MHz i.f. The final 455 kHz i.f. signal is demodulated to provide an audio output and rectified to provide the control voltage for an elaborate "hang" a.g.c. loop which controls both the incoming signal attenuation (PIN diodes between the high-pass and low-pass filter blocks) and the final 455 kHz i.f. signal attenuation (PIN diodes before the "U700" stage shown in fig. 2). The **800 Hz Spot Tone** input shown in the lower left-hand corner of fig. 2 provides for a convenience feature, in that in the c.w. mode only, one can enable an 800 Hz test tone

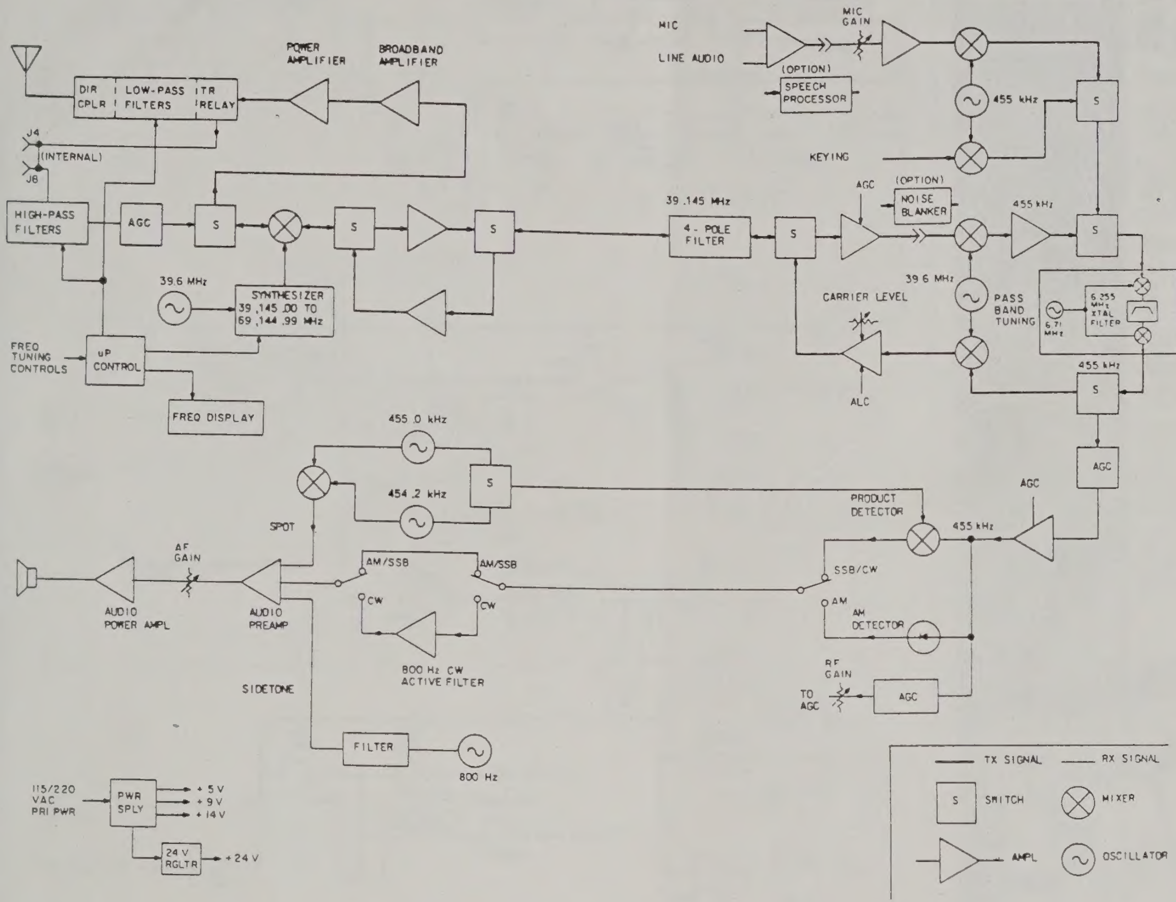


Fig. 1– Overall block diagram of the KWM-380.

to which a received c.w. tone (centered on 800 Hz by a c.w. i.f. filter) can be matched for exact transmit/receive frequency coincidence.

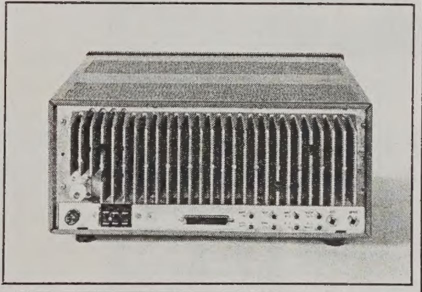
It would be fun to highlight in detail numerous unique circuits used in the KWM-380. However, if one has to use a practical approach by both serving potential purchasers of the KWM-380 and giving readers some circuit ideas, the following should be of special interest.

The basic "front-end" of the KWM-380 is shown in fig. 3. This diagram shows in detail and with circuit values the various filter sections previously mentioned. The antenna signal first encounters the multiple-pole BC band rolloff filter shown as L800-804 and C800-801. The three high-pass filters are each composed of a similar number of components (e.g., five capacitors and two inductors). The 100 μh coils on each side of each filter are RFC's which are used for signal isolation in the PIN diode switching scheme used.

If one studies the diagram a bit, it should be clear that when point K(7) is grounded, the filters are bypassed by diodes CR800-801. When one of the points L(7), M(7), or N(7) is grounded, one of the three filters is selected. The incoming signal then passes on to the diode section between C825-C102. This diode section is an overload protector composed of zener diodes VR100-101 and limit at the 7 volt level. C104 is switched to ground by the variable resistance of PIN diode CR104, which in turn is driven by the chain of a.g.c. amplifiers shown at the bottom of this diagram. The incoming signal then goes through the fixed 30 MHz low-pass filter and on to mixer U100. U100 is a commercial diode ring mixer (type SRA1H from Mini-Circuits Lab., Brooklyn, N.Y. 11229). The signal is, of course, then translated to the first i.f., but note that only then does signal amplification take place. The whole "front-end," so far, has been passive.

The concept and practical usage of the passband tuning used in the KWM-380 is illustrated in fig. 4. The 455 kHz signal coming into mixer U4 has a bandwidth up to 8 kHz. After mixing, the resultant 6.255 MHz signal is routed to any one of five crystal filters: a standard s.s.b. filter (2.1 kHz), standard a.m. filter (8.0 kHz), an optional narrow filter for s.s.b. (1.7 kHz), or optional narow filters for c.w. (140 or 360 kHz). One also has the option of physically substituting an optional 6.0 kHz filter for a.m. for the standard 8.0 kHz one. These filters are all switched in and out by some diode/transistor switching circuitry as controlled by the front-panel selectivity control. The 6.255 MHz signal is then retranslated to 455 kHz in mixer Q1. Since mixers U4 and Q1 have a common injection oscillator, varying the frequency of that oscillator moves the selected filter bandwidth chosen within the overall incoming 8 kHz bandwidth of the incoming 455 kHz signal. The effect of all this is shown in fig. 4(B). It shows the passband tuning effect as one varies the passband tuning control when a standard s.s.b. filter has been selected. Two things should be noted: the filter bandwidth does not vary as its placement is varied, and the operator must set the passband tuning control so either l.s.b. or u.s.b. signals are passed.

Referring back to fig. 1, one can note that the microprocessor control block



The back panel of the KWM-380 consists almost entirely of a huge heat sink. No blower fan is necessary for normal s.s.b./c.w. operation. Various jacks for accessory connections are shown on the bottom of the panel. The r.f. output connector (left, bottom) is really an SO-239. A u.h.f./BNC adapter was left in place by mistake while taking the picture.

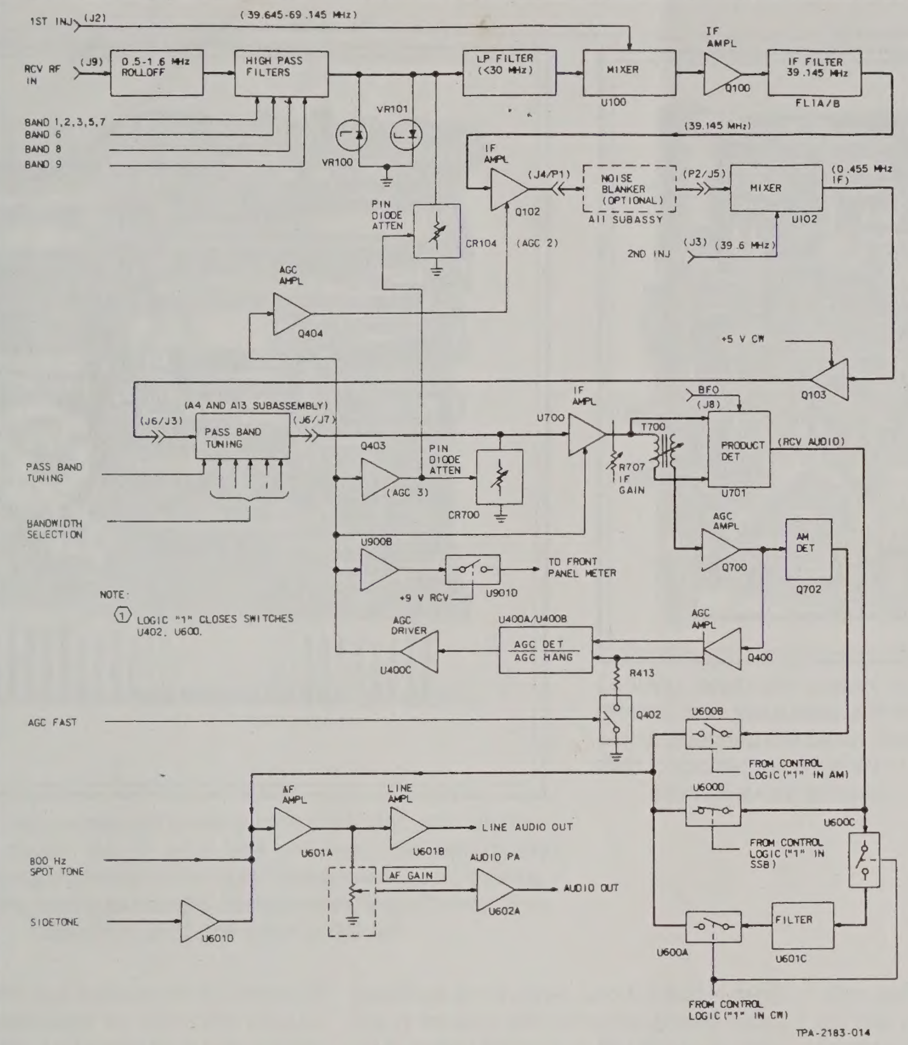


Fig. 2– Block details of the receive chain in the KWM-380.

commands a central position as regards accepting input commands from the frequency tuning controls and then sending out data to various blocks such as those for the synthesizer, frequency display, and high-pass and low-pass filters. The CPU itself is a type 6802. There would be no point in going into all the complex circuitry within the microprocessor and its associated blocks. For example, there are several complex PLL loops within the synthesizer. But, the general concept of control exercised by the microprocessor is interesting. It accepts tuning information from the main tuning knob via photochoppers and senses if the tuning knob rotation is *up* or *down.* It also accepts tuning rate control information from switch settings. It then supplies this data to the synthesizer for frequency generation in 10 Hz steps and to the frequency display for readout to 10 Hz steps. When certain frequency limits are reached, it sends controls to diode switch *in* or *out* high-pass filters in the receive signal chain and relay switch low-pass filters in the transmit signal chain.

Frequency set information is stored for the two A/B v.f.o.'s in the KWM-380 during operation, and the two frequencies can be anywhere within the operating range of the transceiver. However, when power is turned off and then turned on again, the v.f.o.'s are always reset to 15 MHz. The frequency generation and control is arranged such that frequency coverage is continuous without any break for "bands." That is, if the fastest tuning rate is chosen, three revolutions of the tuning knob will completely set the transceiver on any desired frequency between 3.000.00 and 29.999.99 MHz (receive mode; transmit mode is limited to amateur band segments). The other selectable tuning rates are 200 kHz, 20 kHz, and 2 kHz for one main tuning knob revolution.

Fig. 5 shows a few details of the transmit chain in the KWM-380. The basic modes generated are s.s.b. and c.w. For s.s.b. generation a d.s.b. signal is generated at 455 kHz in balanced modulator U501. The signal is then routed through the 2.1 kHz filter contained in the passband tuning circuit used on receive and translated again to 455 kHz as an s.s.b. signal. On transmit, a front-panel mode switch automatically sets the variable oscillator in the passband tuning circuit so a selected l.s.b. or u.s.b. signal is generated. In this manner, and considering the action of the passband tuning control on

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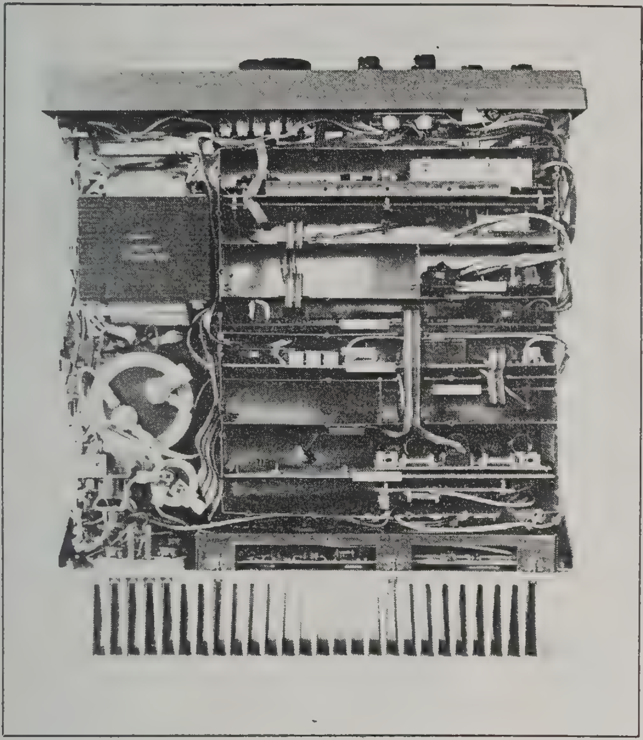
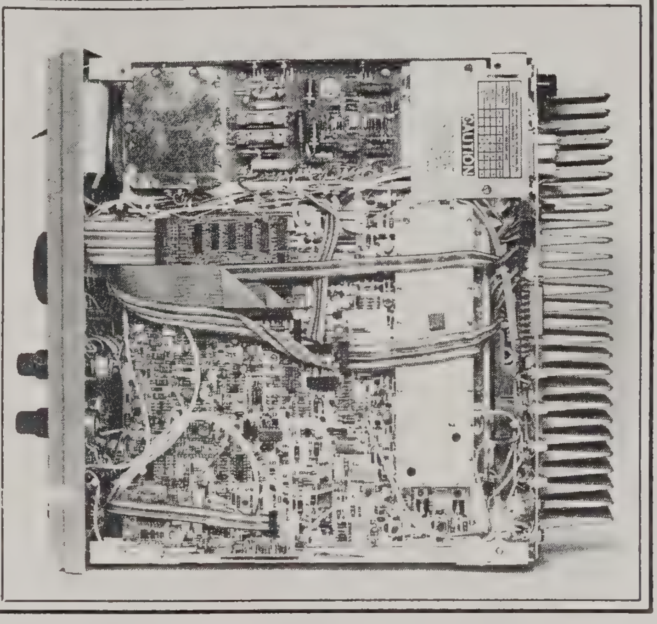


Removing the overall shell cover on the KWM-380 plus an internal shield cover, this is what one will see. The individually shielded compartments on the right contain various PC boards, while the internal power supply components (transformer, filter capacitor, etc.) are seen to the left.



Looking inside the bottom of the KWM-380 with its cover removed, one sees basically one huge, double-sided PC board which contains the basic receive/transmit circuitry (excluding filters, oscillators, frequency readout circuitry, etc.). Note the extensive use of ribbon-type cable with connectors.

receive, one has independent control of sideband selection for transmit/receive. The 455 kHz s.s.b. signal is further frequency translated up to the final operating frequency by the same mixer/oscillator circuits active in the receive mode. The signal reaches the 100 mW level in broadband amplifier stage Q202-204 and is fed on to a power amplifier block.

For c.w. operation, the 455 kHz carrier signal normally injected into the balanced modulator is diode switched into the 455 kHz i.f. chain preceding the passband tuning block. This 455 kHz carrier signal is also gated for c.w. keying by a diode switch, Q503, which is controlled by a pulse shaping circuit, U500C, which provides for controlled rise and decay times during c.w. keying. The c.w. keying circuitry also activates a sidetone oscillator feeding the microphone preamplifier stage. This is provided so the VOX circuitry can also be used on c.w. for receive/transmit switching. The sidetone output is not used to generate a c.w. carrier. The VOX circuitry provides for separate "delay" control settings in the c.w. and s.s.b. modes.

On both s.s.b. and c.w. the output level essentially can be adjusted for QRP levels to full output. On s.s.b. this is accomplished by control of the microphone amplifier gain and on c.w. by circuitry which directly controls the r.f. carrier level via controlled biasing of the a.l.c. loop.

Metering provides for monitoring the a.l.c. level, using the same scale as for S readings on receive, and for direct reading of forward and reflected power levels as sampled at the output of the power amplifier.

Physical Construction

As was mentioned before, the KWM-380 is not a "light-weight" unit. But, the weight, besides deriving from a built-in power supply, comes about from absolutely solid construction. This is initially apparent from the front-panel controls and switches which are all well-dimensioned and of excellent quality. Taking a look at the back of the KWM-380 (see photo), one sees a massive cast aluminum heat sink which covers most of the rear of the unit. It wasn't measured, but I would easily estimate that it contains more square inches of cooling area than are contained on the heat sinks of some 1 kw conduction-cooled linear amplifiers. The back panel view also shows the nice layout of the connectors used, ranging from the antenna and a.c. power connectors on the left to the various connectors for linear amplifier control, speaker, key, etc., on the right side. The special connector in the center is for a special keyboard control option (described later).

To get at the inside of the KWM-380, one has to unscrew and slip off a complete wrap-around, perforated steel shell as can be seen in the rear view photo. Looking inside from a top view, one sees the power supply components on the left side and a multi-shielded compartment on the right side containing various PC boards. Very extensive use is made of ribbon cable interconnecting runs, which are long enough so any individual PC board can be removed for test/replacement without using extender cards. Although it is not too easy to point out, the single internal crystal oscillator which locks the frequency synthesizer is in its own separately shielded compartment on one of the front PC boards. The power amplifier is in a separately shielded compartment at the rear of the unit.

Taking a look at the exposed underside of the transceiver (see photo), one again sees the very extensive use of interconnecting cables between PC boards. The PC boards in themselves are quite interesting to study. They are of a high-quality glass epoxy type with fully plated-through holes, where applicable. Someone at Rockwell/Collins must have given "orders" that no component may be diagonally mounted on a PC board, and even disc ceramic capacitors have to be absolutely lined up at "attention" rather than being allowed to find their often rather natural, helter-skelter mounting state.

Seriously, however, the physical construction of the KWM-380 has to be rated as excellent. Any constructional feature that one looks at augurs for a very long service life for the unit along with reasonably easy service possibilities should a component or board require replacement. Not to detract from the foregoing

FLEXI-BILITY

AEA once again breaks new ground in the code communications field with the new model MBA-RC reader/code converter. The MBA-RC decodes Morse, Baudot or ASCII signals off the air and displays them on a large 32 character alphanumeric vacuum fluorscent display. In addition, it will output Morse code for keying your transmitter. It will also generate RTTY (Baudot or ASCII AFSK two tone output. (170 or 850 Hz shifts.) Any of the acceptable input codes can be converted to any of the specified output codes (any speed to any speed). If you have any of the common Baudot RTTY terminals as an example, you can now send and receive Morse and ASCII with your keyboard and printer. You can even generate ASCII or BAUDOT RTTY using your Morse hand key or memory keyer.

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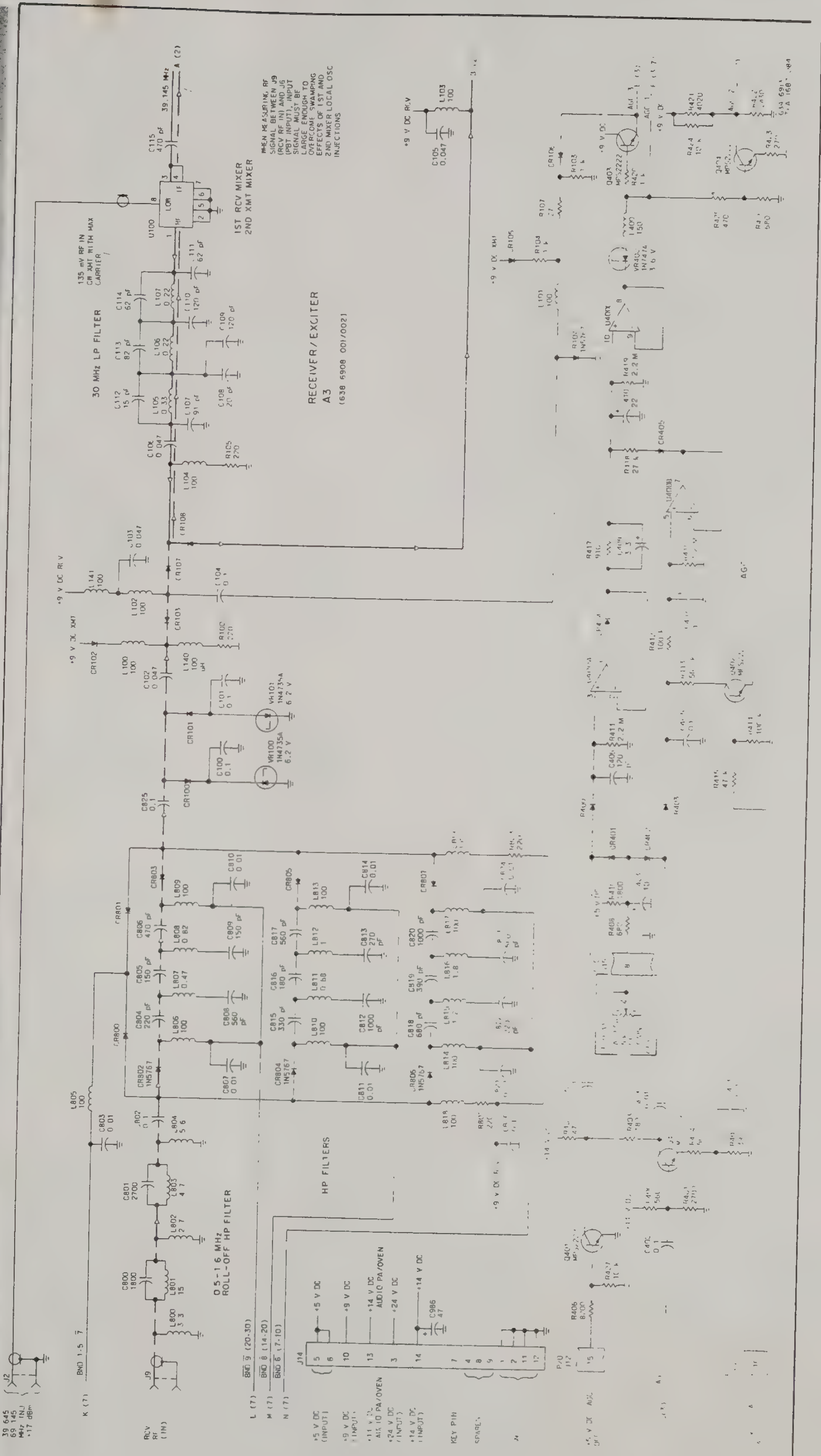

Fig. 3– Unusual "front-end" circuitry used in the KWM-380.

but yet to give the reader a complete picture of the KWM-380, one should mention two things. If one is going to use the KWM-380 under extreme environmental conditions, one has to take note of the perforated covering used. Obviously, operating placements subject to conditions such as a heavy salt-water-laden atmosphere give rise to possible problems. The other point—an extremely minor one to be sure—concerns the microphone input jack. It requires a special PJO-68 plug

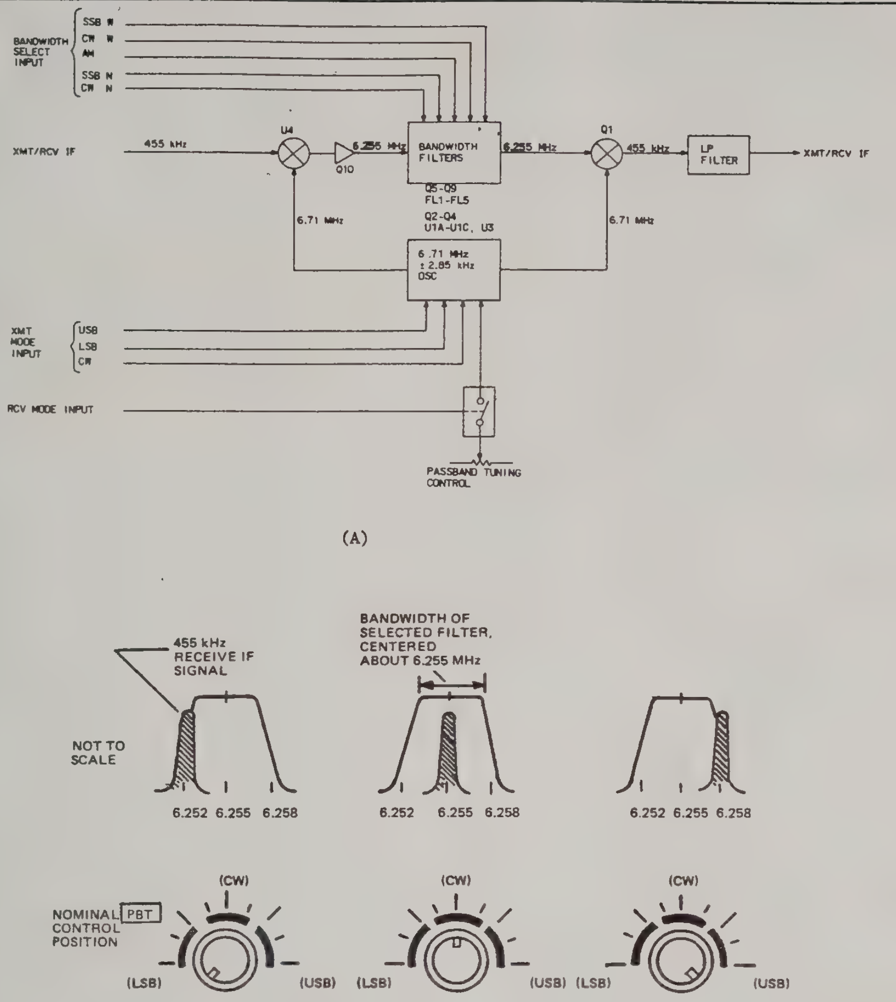

Fig. 4– (A) Basic passband tuning scheme used in the KWM-380. (B) An illustration of how an incoming signal is affected.

fairly common in military and commercial communications spheres but practically unused by radio amateurs. It has been the standard Collins plug for many years.

Test Results

Table I gives the claimed specifications for the KWM-380. To say the least after bench testing a unit, one should regard them as very conservative if not downright deliberately understated.

On the receive side, the KWM-380 greatly exceeded almost all of its claims. The sensitivity ranged around the 0.3 to 0.4 microvolt range for 10 dB STN/N ratio on s.s.b. throughout its tuning range. However, much more significant was the excellent dynamic range. The third order intercept point for 20 kHz spaced signals plotted consistently out in the range of + 14 to + 18 dBm (usually the latter). The synthesizer noise floor could hardly be found with the test equipment available. An educated estimate has to remain at better than − 100 dB.

The synthesizer design is undoubtedly a big part of the secret of the KWM-380's performance. Among other things, it allows the excellent shape factor of the s.s.b. filter to provide meaningful results in practice. The stability was only measured at room temperature rather than over the temperature range specified. A variation of only a few Hertz could be discerned over an operating period from turn-on to an hour or so later. I.f. and image rejection exceeded 70 dB. And, where did all the "birdies" and spurious responses go that one often accepts as being normal with amateur radio equipment designs? I got tired of searching for them. Perhaps there are a few of mini-microvolt proportions someplace, but certainly none are apparent. The S meter requires about 100 microvolts to indicate S9. This is more than the 50 microvolt standard for S9 frequently used, but of more importance is that the S meter response of the KWM-380 is linear within a few dB as signal levels change. So, one can provide a meaningful report to another station when testing antennas, audio devices, etc.

On the transmit side, there is no question that the KWM-380 will deliver a good 100 watts output over all of the amateur bands. It probably could be adjusted to provide 1½ times that power level and for normal s.s.b. operation would run just as cool. There is no fan included in the standard KWM-380, nor is one needed for normal c.w. or s.s.b. operation thanks to the huge PA heatsink on the rear of the unit. For AFSK RTTY operation over extended periods, there is an optional blower kit available which allows 100 watts average output with a 50% duty cycle to be maintained for one hour under keyed conditions! The power amplifier stage contains all sorts of protective circuitry, including the usual thermal and s.w.r. protection. It also contains a rather different forward power averaging circuit. This circuit senses forward power with a long time constant. If the forward power averages too high for too long, it activates a.l.c. circuitry to reduce the PA output in steps down to 20 watts. Output spurious products, including harmonics, were always below − 50 dB and sometimes ranged down to − 70 dB.

However, the most interesting aspect of the transmitted signal was the third-order IMD products. They measured − 32 to − 35 dB from PEP using a two-tone test signal. So, for all practical purposes, the KWM-380 IMD products are as good as any 100 watt class power amplifier using the ubiquitous 6146B tubes, and there is no tuning. The KWM-380 contains an internal power supply which can be strapped for input voltages ranging, in steps, from 105 to 250 volts. It can also operate directly from a 12–15 v.d.c. source. Using the latter, about 3 amperes are drawn in the receive mode and up to 18–20 amperes for 100 watt c.w./s.s.b. operation.

Operating Impressions

As was mentioned before, the transceiver is reset to 15.000.00 MHz when it is turned on. So, one first sees those digits appear rather impressively in their approximate 1 inch height above the main tuning knob. The group of push buttons above the knob controls the tuning rate, locks-out the tuning knob from changing the frequency which has been set, and can be used to synchronize the frequencies of the two built-in v.f.o.'s. Once one gets used to the rather strange symbols used for the tuning-rate buttons, it is rather easy to set up for operation, for example, on 21.195.00 MHz. One presses the ⌉ button for 1 MHz increments and turns the tuning knob less than a full turn until a reading of about 21 MHz appears. One then would normally press one of the ⌈ buttons for a 20 kHz/knob revolution rate to quickly finalize the frequency at 21.195.00 MHz. It takes longer to write about it or to read about it than it takes to accomplish it.

The **Mode** switch is used to select the desired transmit mode, and the **Passband**

Tuning/Selectivity control is set to the desired receive sideband and i.f. bandwidth. There is nothing more to set up or tune on the transceiver, and it is "ready to go" assuming that one has previously chosen VOX or MOX (PTT) mode, a.g.c. speed, speed processor in/out, etc. If one has to adjust an antenna tuner, the **Mode** switch on the KWM-380 can temporarily be set to **CW** and the **Mic/Carrier Level** control used to increase carrier output while the reversed power reading is observed and the antenna tuner is adjusted for minimum indication.

The tuning "feel" of the main tuning knob is extremely good. It feels slightly "heavy," yet turns easily. The other knobs are also very well dimensioned. For instance, the concentric **AF/RF Gain** control knobs are not the disaster found on some receivers. The **RF Gain** knob can readily be manipulated, which c.w. buffs should greatly appreciate.

If one set up the transceiver as mentioned for 21.195.00 MHz (with the v.f.o. switch at **A**) and then suddenly remembered a net on 3.897.50 MHz, it's a simple matter to set the v.f.o. switch to **B**, switch-in the appropriate tuning rate buttons, manipulate the main tuning knob a bit, and be set up on 3.897.50 MHz. One can then switch back and forth between the v.f.o. **A** and **B** settings for actual operation or for just monitoring purposes. The v.f.o.'s can also be set so one controls only the transmit frequency. In other words, half-duplex operation can be carried on between any two amateur bands. If one presses the **Sync** button, the two v.f.o. frequencies align themselves, yet one can be used to control transmit and the other to control receive. In fact, this can be used as a very sophisticated RIT option since the digital display will indicate the exact transmit/receive frequencies and one has independent tuning of each. One only has to remember that the KWM-380 will transmit in the s.s.b. mode as set by the **Mode** switch and receive l.s.b. or u.s.b. as set by the **Passband Tuning** (PBT) control. Of course, once one gets used to the very flexible dual-v.f.o. capability of the KWM-380, one wishes there were a half dozen more such v.f.o.'s so one could store various frequencies within a band and various general-coverage frequencies. In reality, such a provision is provided (see accessory items described next).

The impression that one gets as one uses the KWM-380 on receive both within and outside the amateur bands is its extremely "clean" performance. There is absolutely no hint of overload under the strongest weekend signal conditions, and its uniform sensitivity makes it a completely realistic general-coverage receiver as well as an amateur band transceiver. The "hang" a.g.c. action is excellent, being long enough in time constant to combat QSB, yet not being too delayed to provide full sensitivity once a signal drops out. The sensation of using the main tuning knob to continuously tune is quite something. When one tunes from an indicated 5.999.99 to exactly 6.000.00 MHz the first few times, one expects all sorts of relays to resound, etc. In fact, all is quiet and "bands" for the operator in a practical sense no longer exist.

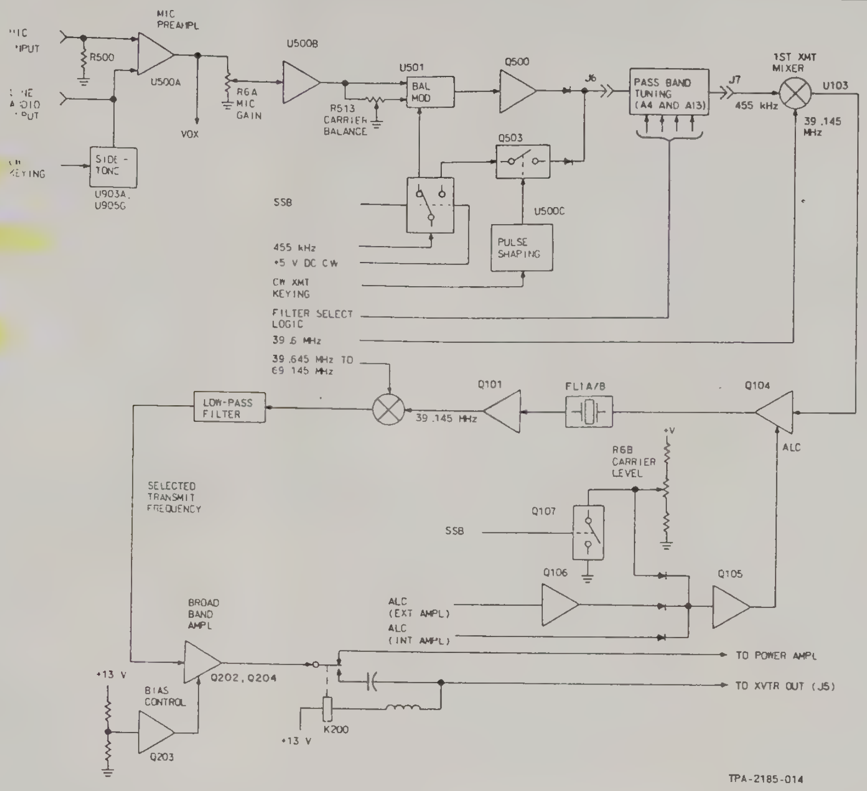

Fig. 5– Block details of the transmit chain in the KWM-380.

The audio quality produced by the front-panel-mounted speaker is perfectly adequate for normal station operation and obviates the need for any accessory speaker (none is offered for the KWM-380). The various optional filters provide for just about any selectivity problem. But, one must face the fact that the KWM-380 does not offer true variable bandwidth i.f. tuning nor a notch filter. Are they necessary? I would say no if one purchases the various optional filters available for the KWM-380, but of course, this does become a price question.

On transmit the KWM-380 consistently produced comments regarding its good audio quality. It has signal "punch" but with a "clean" sounding audio, used either in its basic configuration or with its optional speech processor (described under accessories). Perhaps one reason for this is its shaped frequency response of 300 to 2400 Hz on transmit with only a few dB's level variation within that passband. Another reason is undoubtedly the sophisticated a.l.c. system used, which keeps the average to peak level power level output closely linked. VOX operation was very smooth. C.w. operation was not tried as extensively as s.s.b. operation, but the KWM-380 appears to be as excellent a c.w. transceiver as an s.s.b. one. The separate **C.W. Delay** control on the VOX circuitry is very handy to set up for semi-QSK operation on c.w. Used for normal s.s.b. or c.w. operation, the transceiver will run "cool" indefinitely. There is no cooling needed (except for extended RTTY operation), so operation is perfectly quiet.

Accessory Items

There is an extensive line of optional and accessory items available for the KWM-380. The internal mount optional items include WARC conversion, various i.f. filters, a noise blanker, a speech processor, and a control interface. The outboard accessory items range all the way from different types of microphones and headphones to a blower kit for the heatsink. Some items have been mentioned in passing before, so only a few will be covered in detail.

The WARC conversion consists of replacing an ROM IC on a PCB within the transceiver. The conversion requires the removal of some 39 screws to get at the required PC board. Some versions of the PC board have the IC socketed and some do not. So, the conversion either can be extremely simple or require a bit of soldering. In any case, the conversion will result in the frequency coverage change shown in Table II. Note that the conversion not only provides for WARC coverage, but also expands the 80–15 meter bands for MARS transceive coverage.

The optional speech processor available for the KWM-380 is of a completely new design and a patent is pending on it. It is an audio processing type, but hardly a simple compressor or clipper. In its literature, Collins concedes that the gener-

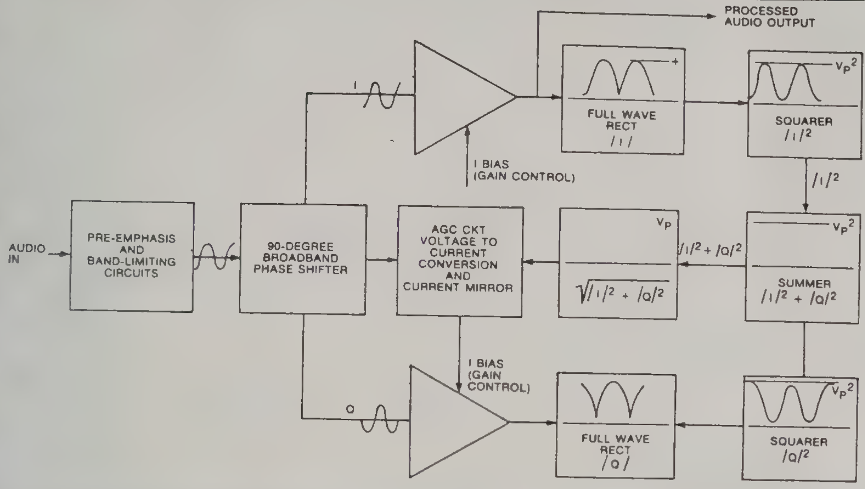

Fig. 6– Block diagram of the circuit functions in the new type of AF speech processor which is an option for the KWM-380.

al consensus is that r.f. speech processing provides the best results, but with some undesirable harmonic distortion and r.f.i. as inherent in any clipping action. They claim their method is as good as r.f. processing without any of its disadvantages. A block diagram of the processor is shown in fig. 6. The actual physical unit is a PC board measuring about 4¼″ × 4½″ and contains some 13 IC's and 8 transistors. A later article may explore the concept of this item in depth, but the general idea, as shown in fig. 6, is that the microphone signal is divided into two 90 degree phase shifted signals which are detected and recombined and produce a d.c. signal proportional to the peak signal at the detectors. The gain of the phase amplifiers is regulated to produce an a.f. signal with *peaks* maintained at a preset threshold. Harmonic distortion is claimed to be about 1½% across the 300–3000 Hz range for about 15 dB of voice processing. From tests made with the KWM-380 there is no doubt that the optional processor does add something in the order of 4 to 6 dB of apparent increased signal intelligibility with no apparent distortion. It works and works extremely well, but whether it is the ideal solution to the question of speech processing remains open. In any case, it is an outstanding advance in audio-type processing.

The Control Interface option is innocuous sounding, but it adds tremendous versatility to operation of the KWM-380. The option itself consists of a PC board assembly and a connector which is for inter-connection with a user-supplied external key pad (any sixteen button, two-out-of-eight device) or possibly a home computer with parallel interface capability. In any case, the interface allows for the digital selection, storage, or recall of frequencies (the storage/recall capability being either 10 or 11 frequencies, depending upon whether the WARC option is installed).

Using a key pad, the operating frequency can be selected from either the main tuning knob or the key pad. One simply enters the frequency desired digit by digit. The frequency being entered on the key pad is displayed, but the transceiver's operating frequency is only changed when an "enter" key is depressed. The interface PC board contains memory locations for 10 (or 11) frequencies inde-

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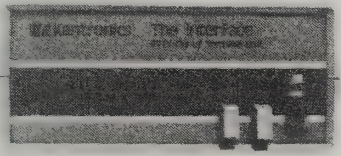

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Band (Meters)	Without SB 10 (MHz)	With SB 10 (MHz)
160	1.8 to 2.0	No change
80	3.5 to 4.0	3.25 to 4.25
40	7.0 to 7.3	6.75 to 7.55
30	—	10.10 to 10.15
20	14.0 to 14.35	13.75 to 14.60
16	—	18.060 to 18.170
15	21.00 to 21.45	20.75 to 21.70
12	—	24.890 to 24.990
10	28.0 to 29.7	No change

Table II– Transceive frequency coverages of the KWM-380 when the SB 10 WARC option ROM is installed.

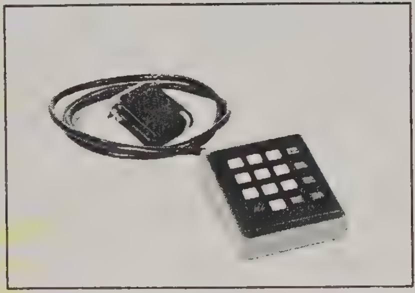
pendent of the two v.f.o. registers. To store any frequency, it is entered by keyboard selection and addressed to a desired memory location (e.g., 1, 2, 3, etc.). The transceiver can continue on its tuning knob selected operating frequency, if desired, during the process. Or, the current operating frequency can be stored by a store and memory location key pad command. Recalling a frequency consists of pressing a recall key and a memory location. This action loads the stored frequency into the v.f.o. register in use (A or B) and sets the transceiver's operating frequency to the recalled frequency. One can also use key-pad commands to manually step the transceiver through each memory starting from the present memory location in use. Blank or cleared memory locations are skipped during the manual stepping process.

The key pad frequency control option obviously adds all sorts of operating possibilities to the KWM-380, ranging from serious DX chasing across several bands if desired (remember, there is no bandswitch) to switching to a news program during a boring net session. Removing power from the transceiver will clear all memory locations.

Manual and Service Notes

An operating manual does, of course, come with the KWM-380, and it contains very clear, practical information for getting the unit into operation. It has a multitude of photos and illustrations all directed towards telling the operator how to hook up the transceiver, which controls to turn for various functions, etc. It also contains a limited amount of information on maintenance and some PC board interconnection data, so if a PC board is exchanged, one can understand which interconnecting cables are involved.

A separate, quite elaborate service manual is available for about $40. This manual is extremely complete with thorough information on PC board layouts, schematic diagrams, alignment and test data, etc. Complete parts data is given along with the name and address in the U.S. of the manufacturer of every component used (except common resistors, capacitors, hardware, etc.). The manual also contains a complete set of service bulletins issued for the KWM-380 and a postcard reply form which will put the purchaser on automatic distribution for all future service bulletins as long as the KWM-380 remains in production. Quite a few such service bulletins were issued up to January 1981. The last one contained in the manual reviewed was dated August 1981 and was only information on WARC conversion.



The KWM-380 can be remotely controlled by a key pad such as the one shown here (or a similar one supplied by the user). A control interface option has to be installed in the KWM-380 to use the key pad, but then one will have key-pad control of frequency entry, storage, and recall. If one imagines the key pad on the right of the front-panel view of the KWM-380 showing the microphone on the left, one has a completely integrated, automated h.f. station.

Dealer and factory service for the KWM-380 is available and there is a one-year warranty. Those restricted to certain APO/FPO addresses, however, might note that the KWM-380 is too large (with packing) for Parcel Post shipment, and freight shipment must be used.

Summary

The KWM-380 is an outstanding piece of equipment. It offers extremely sophisticated operating capabilities using state-of-the-art technology, but without a front panel so cluttered with knobs, push buttons, and switches that one misses out on the fun of operating while trying to figure out how to operate a transceiver. It is not inexpensive. But, its design concept is sound, and, as Rockwell/Collins is willing to put in black and white, "No yearly model changes. As circuit improvements and modifications are made to the KWM-380, its style does not become obsolete." CQ

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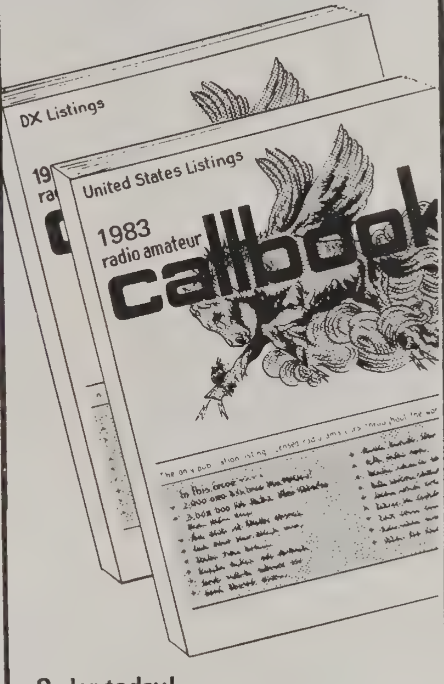

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KWM-2

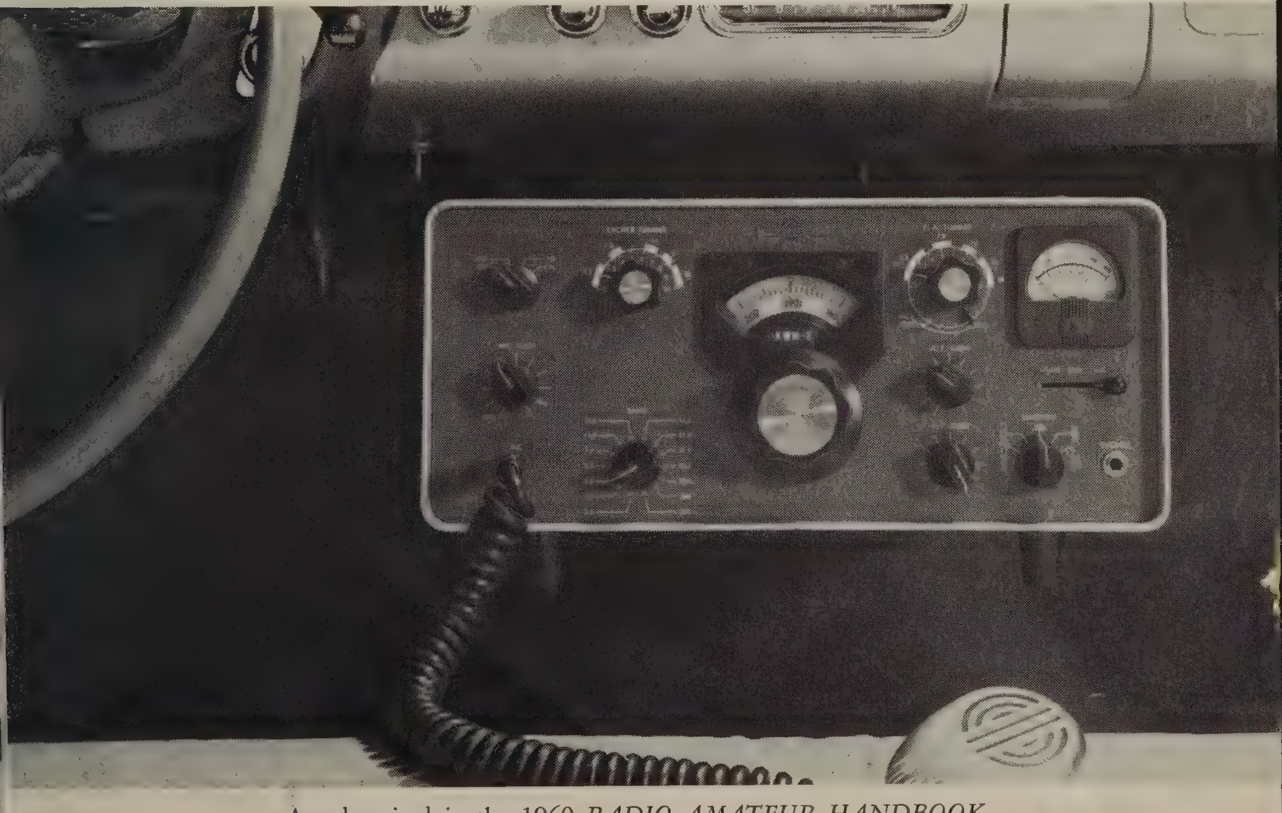
Another Collins creative design – the advanced amateur's 80-10 meter transceiver – system engineered for mobile and home operation.

Superior single sideband performance in a variety of installations is assured by the Collins KWM-2 Mobile Transceiver. Engineered for the amateur who desires an 80 through 10 meter mobile transceiver, the KWM-2 design incorporates time-proven and advanced communication concepts.

The Mobile Transceiver provides outstanding frequency stability on fourteen 200 kc bands from 3.4 mc to 30.0 mc. With 175 watts PEP input on SSB, or 160 watts on CW, the KWM-2 provides ample power for dependable amateur communication. Filter type SSB generation, Collins permeability-tuned variable oscillator, crystal-controlled HF double conversion oscillator, VOX and anti-trip circuits, and exclusive ALC and RF inverse feedback are among the features of the KWM-2. The Collins Mechanical Filter, RF amplifier, all tuned circuits, and several tubes perform the dual role of transmitting and receiving. CW break-in and monitoring sidetone circuits are built-in, and all four plugs in the mobile mount connect the KWM-2 automatically. A connector on the rear provides for antenna selection or loading coil selection for mobile operation.

The Collins KWM-2 Mobile Transceiver weighs 18 lbs. 3 oz. and measures 7¾" H (including legs), 14¾" W, and 13¼" D. Mounts, accessories, and power supplies are available for 12 v dc, and 115 v ac operation.

See the KWM-2 now on display at your Collins Distributor. Ask for the colorful KWM-2 brochure with complete specifications.



As advertised in the 1960 *RADIO AMATEUR HANDBOOK.*

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The S/Line is a complete station for the advanced amateur. The 32S-1 Transmitter and 75S-1 Receiver may be operated separately or as a transceiver in which the receiver controls the transmitter frequency. The 312B-4 Speaker Console integrates the two units further with over-all station control, and control of a directional wattmeter for maximum output efficiency. For the amateur desiring the strongest signal, the 30S-1 Linear Amplifier provides maximum legal output with greatly simplified operation.

32S-1 Transmitter

The 32S-1 is an SSB or CW transmitter with a nominal output of 100 watts on all amateur bands between 3.5 and 29.7 mc. Input power is 175 watts PEP on SSB or 160 watts on CW.

The transmitter covers 3.5 to 30 mc except for the 5.0-6.5 mc range. Crystal sockets, crystals and bandswitch position are provided for ten 200 kc bands, with the standard amateur configuration equipped as follows: 3.4-3.6, 3.6-3.8, 3.8-4.0; 7.0-7.2,7.2-7.4; 14.0-14.2, 14.2-14.4; 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and bandswitch positions also are provided for three 200 kc bands between 28 and 29.7 mc. One of these sockets is equipped with a crystal for 28.5 to 28.7 mc. A fourteenth position, corresponding to the WWV position on the receiver, can be used for an additional 200 kc band in the 9.5-15.0 mc range, if desired.

Features which have made Collins amateur SSB equipment famous are incorporated into the 32S-1, including Mechanical Filter-type sideband generation; stable, permeability-tuned VFO; crystal-controlled HF oscillator; RF inverse feedback for better linearity; automatic load control for higher average talk power and protection against flattopping.

For ac operation, the 516F-2 Power Supply is used with the 32S-1; for 12 v dc operation, the 516E-1 used with the KWM-1 and KWM-2 may be used with minor modification.

Specifications

EMISSION: SSB — upper or lower sideband. CW—keyed tone.

POWER INPUT: 175 watts PEP on SSB. 160 watts on CW.

POWER OUTPUT: 100 watts PEP nominal (slightly lower on 10 meters) into 50 ohms.

OUTPUT IMPEDENCE: 50 ohms nominal with not more than approximately 2 to 1 SWR. Impedance match variable 25-100 ohms.

FREQUENCY STABILITY: After warm-up, over-all stability due to temperature, humidity, pressure and voltage variation is 100 cps. Calibration accuracy: 1 kc.

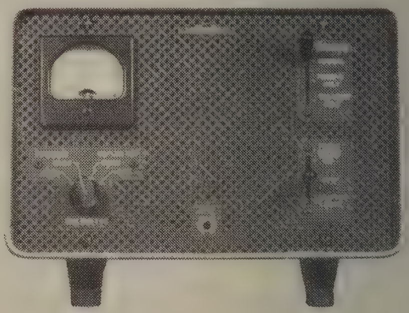
VISUAL DIAL ACCURACY: 200 cps on all bands.

ELECTRICAL DIAL ACCURACY: After calibration: 300 cps on all bands.

HARMONIC AND OTHER SPURIOUS RADIATION: Carrier suppression —40 db. Unwanted sideband —50 db. Oscillator feed-through and/or mixer products —50 db. Second harmonic —50 db. 3rd order distortion —30 db.

75S-1 Receiver

312B-4 Speaker Console



312B-4 Speaker Console

The 312B-4 (pictured between 75S-1 and 32S-1 below) houses a speaker, and RF directional wattmeter with 200 and 2000 watt scales, and switches for various station control functions.

75S-1 Receiver

The 75S-1 provides SSB, CW and AM reception on all amateur bands between 3.5 and 29.7 mc. It is capable of coverage of the entire HF spectrum between 3.5 and 30 mc by selection of the appropriate HF heterodyning crystals.

The standard amateur configuration includes crystal sockets, crystals and bandswitch positions for: 3.4-3.6, 3.6-3.8, 3.8-4.0; 7.0-7.2, 7.2-7.4; 14.0-14.2, 14.2-14.4; 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and bandswitch positions are also provided for three 200 kc bands between 28 and 29.7 mc, with one of the sockets equipped with a crystal for 28.5 to 28.7 mc. A crystal and bandswitch position is also provided for 14.8-15.0 mc for reception of WWV and WWVH for time and frequency calibration data.

The same standard of excellence and many of the design features of the 75A-4 are incorporated in the 75S-1. These include dual conversion with a crystal-controlled first heterodyning oscillator; bandpass first IF; stable, permeability-tuned VFO; RF amplifier designed to minimize cross modulation products; Mechanical Filter; excellent AVC characteristics; and both product and diode detector.

New features include the use of only 150 volts on vacuum tube plates, use of silicon diodes in lieu of conventional high vacuum rectifier; and choice of three degrees of selectivity (with optional CW filter).

A power connector at the rear of the 75S-1 chassis provides for disabling the internal ac power supply so that the 12 v dc power supply for the KWM-2 may power the receiver as well as the transmitter.

Specifications

VISUAL DIAL ACCURACY: 200 cps on all bands.

ELECTRICAL DIAL ACCURACY: (after calibration) 300 cps on all bands.

SENSITIVITY: The CW sensitivity is better than 1 microvolt (with a 50-ohm dummy antenna) for a 15 db signal-plus-noise-to-noise ratio.

SELECTIVITY: 2.1 kc Mechanical Filter for SSB; 0.5 kc Mechanical Filter (not supplied) for CW; 4.0 kc IF transformer passband for AM.

SPURIOUS RESPONSE: Image rejection is more than 50 db. Internal spurious signals below 1 microvolt equivalent antenna input.

30S-1 Linear Amplifier

The 30S-1 is a completely self-contained, single tube, grounded grid linear amplifier. Requiring 70 to 100 watts driving power (from the 32S-1 or KWM-2, for example), it provides the full legal power input for SSB (1 kw average) or 1 kw input for CW. The tube used is the Eimac 4CX1000A. The 30S-1 may be used on any frequency between 3.4 and 30 mc.

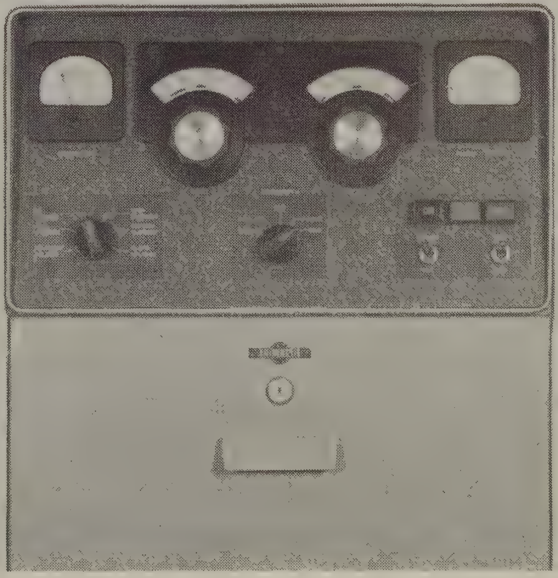
The 30S-1 may be loaded into an antenna without exceeding the legal dc input of 1 kw during tune-up. Front panel switching makes two different power levels immediately available for SSB operation: 100 watts from the exciter alone or the full 1 kw meter average input for SSB. The air blower for the 4CX1000A operates quietly — barely audible in a quiet room. The power supply for the 30S-1, which is housed in the lower portion of the cabinet, provides cathode bias voltage, screen voltage and 3000 volts for the 4CX1000A plate. Space is provided in this compartment for the 516F-2 Power Supply.

Extended Frequency Versions of the S/Line

The 32S-1 and 75S-1 are available in extended frequency versions, designated the 75S-2 and 32S-2. The two differ from the original only in that an additional crystal board has been added beneath the chassis. In this board is placed the standard complement of ham band crystals normally received with the equipment. The upper board is left empty so that the amateur may place whatever additional crystals he may desire up to a total of 14. A front panel switch is added to allow switching between the two crystal boards.

32S-1 Transmitter

30S-1 Linear Amplifier



Collins

S/LINE accessories and KWM-2

302C-3 Directional Wattmeter– Measures forward and reflected power on 200 and 2000 watt scales. Coupler unit mounts separate from indicator-control box. Power loss and mismatch introduced by the instrument are negligible.

B312-1 Directional Coupler – The coupler unit from the 302C-3 for amateurs who desire to utilize an optional meter and switch for a customized fixed installation or for a mobile installation.

351E Table Mounts – For mounting the S/Line and KWM-2 on planes, boats, etc. May be fastened to any flat surface. Front clamps attach to the feet of the units for secure hold-down. 351E-1 for 32S-1, 75S-1; 351E-2 for 312B-4, 516F-2; 351E-3 for 312B-3, 351E-4 for KWM-2.

351D-2 Mobile Mount – Provides secure mounting for KWM-2 in most automobiles. Cantilever arms fold out of the way when KWM-2 is removed.

Mating plugs connect power, receive-transmit antenna, noise blanker, antenna and antenna control as KWM-2 slides into place. Cables included.

312B-5 Speaker Console and External PTO– Used with KWM-2 in fixed station operation to provide separate receiving and transmitting control, and directional wattmeter.

399C-1 Speaker and External PTO– Contains speaker and external PTO for separate receiver and transmitter control of KWM-2.

136 Series Noise Blankers – Provide effective reduction of impulse-type noise, particularly ignition noise. 136A-1 for 75S-1; 136B-1 for KWM-1; 136B-2 for KWM-2; 136C-1 for 75A-4.

312B-3 Speaker – Contains a 5" x 7" speaker and connecting cable. Attractively styled to match receiver and transmitter.

516F-2 AC Power Supply– Operates from 115 v ac, 50-60 cps. Provides all voltages for the 32S-1.

516E-1 Power Supply – Operates from 12 v dc. Provides all required voltages for the KWM-2 or 32S-1 and 75S-1 for mobile or portable operation. Transistorized for maximum efficiency and minimum maintenance. The 516E-2, a 28 v dc supply may also be used.

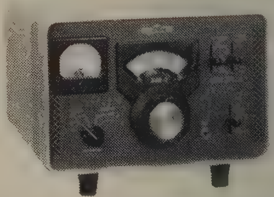
For addresses of Collins dealers or further information and complete specifications on the entire Collins S/Line and accessories, write to: Amateur Sales, Collins Radio Company, Cedar Rapids, Iowa.

COLLINS

COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • BURBANK, CALIFORNIA

302C-3

351E-1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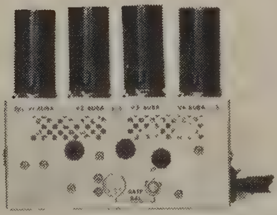
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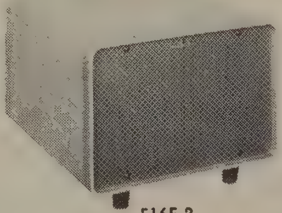
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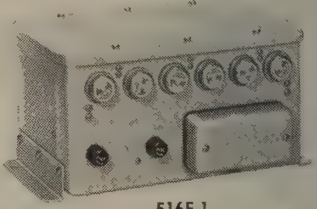

516E-1

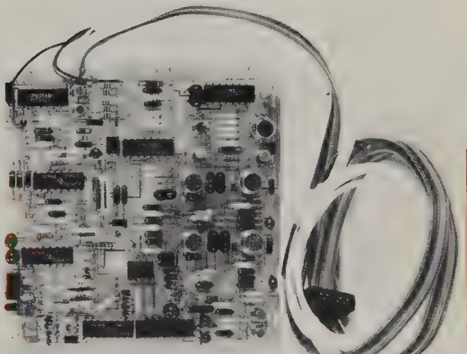
Radio-Electronics

Rockwell
International

New Product Announcement

AC-3802

Speech Processor
IQ Power



Over the years there have been many approaches used to increase the effective "talk-power" of HF-SSB transmissions. Each approach has distinct advantages and disadvantages. From a performance viewpoint there has been a general consensus that rf speech processing provides the best results. However, with rf speech processing there is concern relative to harmonic distortion and rfi generation.

Now, Collins Amateur Products has developed a method which has all the advantages of rf speech processing without the disadvantages of undesirable harmonic distortion and rfi generation. The AC-3802 IQ Power (TM) Speech Processor has been developed as a "plug-in" option for the KWM-380 and HF-380 series transceivers.

The AC-3802 employs a unique two-channel (in-phase and quadrature-phase) design which eliminates the usual problems encountered with rf interferences. Mixing oscillators and rf filters are not required. Harmonic distortion is typically 1-1/2% since no clipping is used. The processing function is smooth and continuous across the 300-3000 Hz speech range.

The AC-3802 processor technology focuses on an envelope detector which follows the instantaneous speech modulation envelope to produce an output which is an exact reproduction of the speech envelope.

The modulation envelope is derived from the voice signal by dividing the signal into two channels, an in-phase channel and a quadrature-phase channel. Because of the phase shifting results obtained from this technique, we refer to this circuit as an IQ power speech processor.

The processor is essentially a preemphasis circuit followed by a variable gain stage. The speech modulation envelope is compared with a preset level threshold. Whenever the speech modulation envelope peaks exceed the threshold, the gain of the variable stage is reduced.

Speech peaks are matinained at the preset threshold and since only the modulation envelope level is controlled, no clipping occurs. As a result, voice peaks are compressed and the average-peak-to-signal level is increased. The envelope detector requires no filtering; therefore, there is no processing delay and peak compression is instantaneous.

Audio from the microphone is amplified and then divided into two signals which are phase shifted 90 degrees (in-phase and quadrature-phase). These signals are each detected and then recombined to produce a dc signal which is proportional to the peak voltage squared from the rectifiers. The square root of this level produces a dc level that is equivalent to the peak signal at the detectors.

The new dc level is compared to the preset compression threshold level producing an AGC voltage that regulates the gain of the phase amplifiers. The result is an audio voltage with peaks that are maintained at the preset threshold.

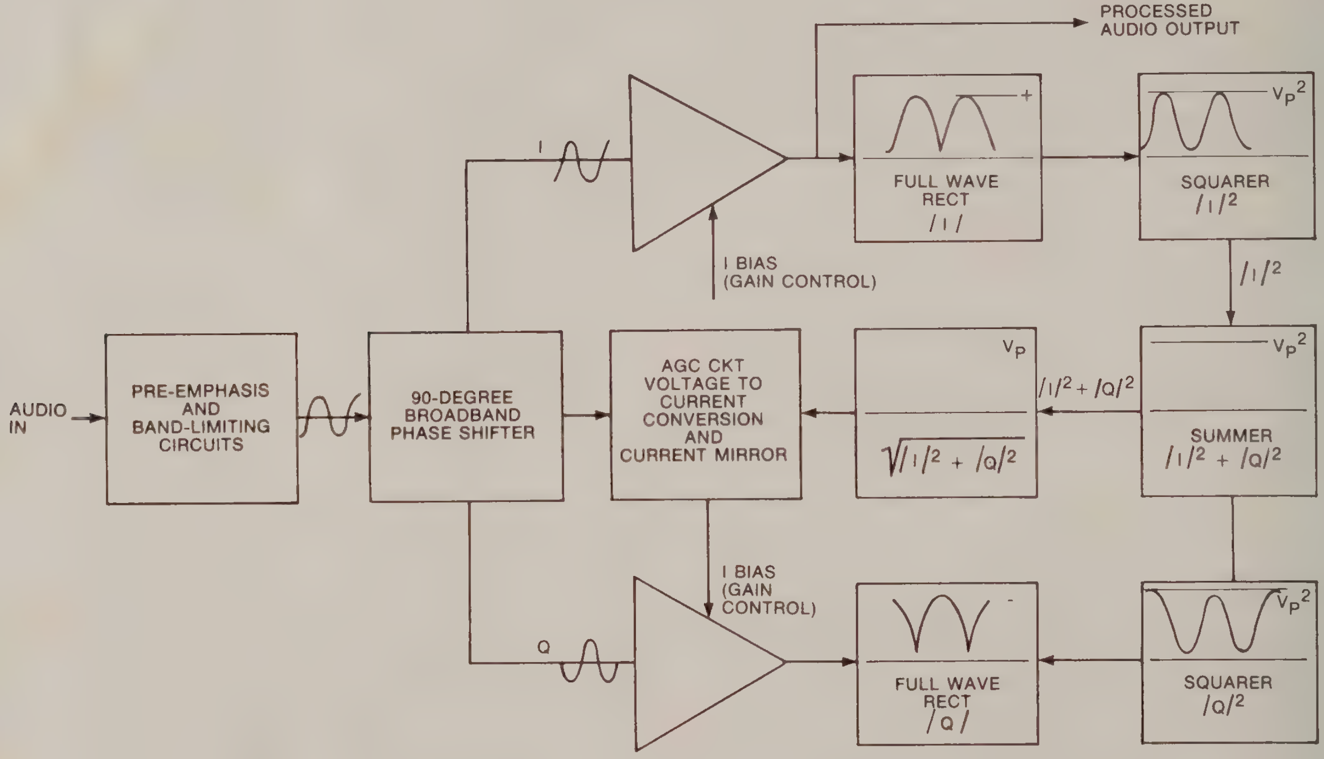
The processed audio is taken from the output of the in-phase amplifier. When processing in either the KWM-380 or the HF-380 is not required, a control signal to the processor via the front panel switch causes the audio from the amplifier to bypass the processing circuitry.

*Patent applied for.

The AC-3802 is constructed on a single circuit card which plugs into the KWM-380 or HF-380 transceivers. All operating voltages and control is provided by the transceiver. Station clutter including external cabling is eliminated and the station integrity of the Collins Pro-mark (TM) transceivers is maintained.

The AC-3802 IQ Power (TM) Speech Processor is the intelligent approach to increased "talk-power". Another advancement from the professionals at Collins Amateur Products — Rockwell International.

Specifications subject to change without notice.



AC-3802 IQ Power (TM) Speech Processor

Collins Telecommunications Products Division
Electronic Systems Group/Rockwell International
Cedar Rapids, Iowa 52406

Collins mobile transceiver

KWM-2

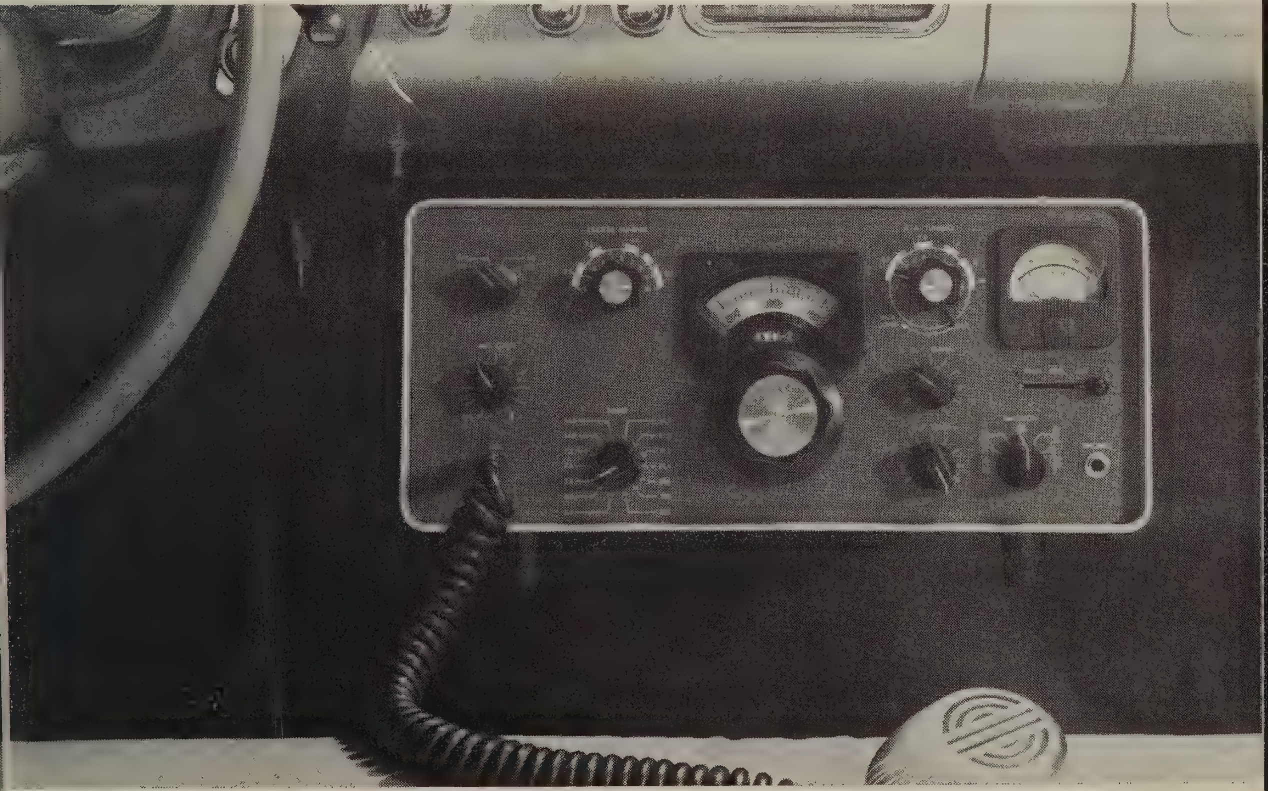
Another Collins creative design – the advanced amateur's 80-10 meter transceiver – system engineered for mobile and home operation.

Superior single sideband performance in a variety of installations is assured by the Collins KWM-2 Mobile Transceiver. Engineered for the amateur who desires an 80 through 10 meter mobile transceiver, the KWM-2 design incorporates time-proven and advanced communication concepts.

The Mobile Transceiver provides outstanding frequency stability on fourteen 200 kc bands from 3.4 mc to 30.0 mc. With 175 watts PEP input on SSB, or 160 watts on CW, the KWM-2 provides ample power for dependable amateur communication. Filter type SSB generation, Collins permeability-tuned variable oscillator, crystal-controlled HF double conversion oscillator, VOX and anti-trip circuits, and exclusive ALC and RF inverse feedback are among the features of the KWM-2. The Collins Mechanical Filter, RF amplifier, all tuned circuits, and several tubes perform the dual role of transmitting and receiving. CW break-in and monitoring sidetone circuits are built-in, and all four plugs in the mobile mount connect the KWM-2 automatically. A connector on the rear provides for antenna selection or loading coil selection for mobile operation.

The Collins KWM-2 Mobile Transceiver weighs 18 lbs. 3 oz. and measures 7¾″ H (including legs), 14¾″ W, and 13¼″ D. Mounts, accessories, and power supplies are available for 12 v dc, and 115 v ac operation.

See the KWM-2 now on display at your Collins Distributor. Ask for the colorful KWM-2 brochure with complete specifications.



As advertised in the 1960 *RADIO AMATEUR HANDBOOK.*

PRINTED IN U.S.A.

Collins S/LINE

superiority in single sideband systems

The S/Line is a complete station for the advanced amateur. The 32S-1 Transmitter and 75S-1 Receiver may be operated separately or as a transceiver in which the receiver controls the transmitter frequency. The 312B-4 Speaker Console integrates the two units further with over-all station control, and control of a directional wattmeter for maximum output efficiency. For the amateur desiring the strongest signal, the 30S-1 Linear Amplifier provides maximum legal output with greatly simplified operation.

32S-1 Transmitter

The 32S-1 is an SSB or CW transmitter with a nominal output of 100 watts on all amateur bands between 3.5 and 29.7 mc. Input power is 175 watts PEP on SSB or 160 watts on CW.

The transmitter covers 3.5 to 30 mc except for the 5.0-6.5 mc range. Crystal sockets, crystals and bandswitch position are provided for ten 200 kc bands, with the standard amateur configuration equipped as follows: 3.4-3.6, 3.6-3.8, 3.8-4.0; 7.0-7.2,7.2-7.4; 14.0-14.2, 14.2-14.4; 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and bandswitch positions also are provided for three 200 kc bands between 28 and 29.7 mc. One of these sockets is equipped with a crystal for 28.5 to 28.7 mc. A fourteenth position, corresponding to the WWV position on the receiver, can be used for an additional 200 kc band in the 9.5-15.0 mc range, if desired.

Features which have made Collins amateur SSB equipment famous are incorporated into the 32S-1, including Mechanical Filter-type sideband generation; stable, permeability-tuned VFO; crystal-controlled HF oscillator; RF inverse feedback for better linearity; automatic load control for higher average talk power and protection against flattopping.

For ac operation, the 516F-2 Power Supply is used with the 32S-1; for 12 v dc operation, the 516E-1 used with the KWM-1 and KWM-2 may be used with minor modification.

Specifications

EMISSION: SSB — upper or lower sideband. CW—keyed tone.

POWER INPUT: 175 watts PEP on SSB. 160 watts on CW.

POWER OUTPUT: 100 watts PEP nominal (slightly lower on 10 meters) into 50 ohms.

OUTPUT IMPEDENCE: 50 ohms nominal with not more than approximately 2 to 1 SWR. Impedance match variable 25-100 ohms.

FREQUENCY STABILITY: After warm-up, over-all stability due to temperature, humidity, pressure and voltage variation is 100 cps. Calibration accuracy: 1 kc.

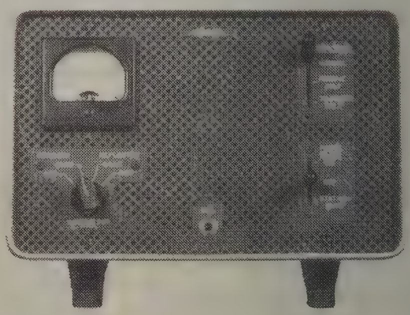
VISUAL DIAL ACCURACY: 200 cps on all bands.

ELECTRICAL DIAL ACCURACY: After calibration: 300 cps on all bands.

HARMONIC AND OTHER SPURIOUS RADIATION: Carrier suppression —40 db. Unwanted sideband —50 db. Oscillator feed-through and/or mixer products —50 db. Second harmonic —50 db. 3rd order distortion —30 db.

75S-1 Receiver

312B-4 Speaker Console



312B-4 Speaker Console

The 312B-4 (pictured between 75S-1 and 32S-1 below) houses a speaker, and RF directional wattmeter with 200 and 2000 watt scales, and switches for various station control functions.

75S-1 Receiver

The 75S-1 provides SSB, CW and AM reception on all amateur bands between 3.5 and 29.7 mc. It is capable of coverage of the entire HF spectrum between 3.5 and 30 mc by selection of the appropriate HF heterodyning crystals.

The standard amateur configuration includes crystal sockets, crystals and bandswitch positions for: 3.4-3.6, 3.6-3.8, 3.8-4.0; 7.0-7.2, 7.2-7.4; 14.0-14.2, 14.2-14.4; 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and bandswitch positions are also provided for three 200 kc bands between 28 and 29.7 mc, with one of the sockets equipped with a crystal for 28.5 to 28.7 mc. A crystal and bandswitch position is also provided for 14.8-15.0 mc for reception of WWV and WWVH for time and frequency calibration data.

The same standard of excellence and many of the design features of the 75A-4 are incorporated in the 75S-1. These include dual conversion with a crystal-controlled first heterodyning oscillator; bandpass first IF; stable, permeability-tuned VFO; RF amplifier designed to minimize cross modulation products; Mechanical Filter; excellent AVC characteristics; and both product and diode detector.

New features include the use of only 150 volts on vacuum tube plates, use of silicon diodes in lieu of conventional high vacuum rectifier; and choice of three degrees of selectivity (with optional CW filter).

A power connector at the rear of the 75S-1 chassis provides for disabling the internal ac power supply so that the 12 v dc power supply for the KWM-2 may power the receiver as well as the transmitter.

Specifications

VISUAL DIAL ACCURACY: 200 cps on all bands.
ELECTRICAL DIAL ACCURACY: (after calibration) 300 cps on all bands.
SENSITIVITY: The CW sensitivity is better than 1 microvolt (with a 50-ohm dummy antenna) for a 15 db signal-plus-noise-to-noise ratio.
SELECTIVITY: 2.1 kc Mechanical Filter for SSB; 0.5 kc Mechanical Filter (not supplied) for CW; 4.0 kc IF transformer passband for AM.
SPURIOUS RESPONSE: Image rejection is more than 50 db. Internal spurious signals below 1 microvolt equivalent antenna input.

30S-1 Linear Amplifier

The 30S-1 is a completely self-contained, single tube, grounded grid linear amplifier. Requiring 70 to 100 watts driving power (from the 32S-1 or KWM-2, for example), it provides the full legal power input for SSB (1 kw average) or 1 kw input for CW. The tube used is the Eimac 4CX1000A. The 30S-1 may be used on any frequency between 3.4 and 30 mc.

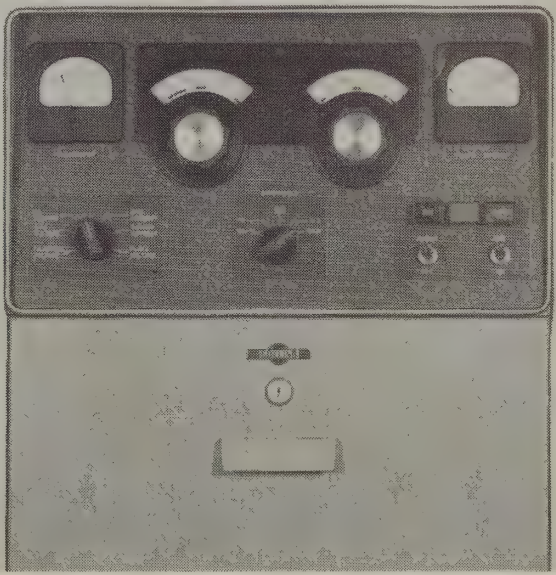
The 30S-1 may be loaded into an antenna without exceeding the legal dc input of 1 kw during tune-up. Front panel switching makes two different power levels immediately available for SSB operation: 100 watts from the exciter alone or the full 1 kw meter average input for SSB. The air blower for the 4CX1000A operates quietly — barely audible in a quiet room. The power supply for the 30S-1, which is housed in the lower portion of the cabinet, provides cathode bias voltage, screen voltage and 3000 volts for the 4CX1000A plate. Space is provided in this compartment for the 516F-2 Power Supply.

Extended Frequency Versions of the S/Line

The 32S-1 and 75S-1 are available in extended frequency versions, designated the 75S-2 and 32S-2. The two differ from the original only in that an additional crystal board has been added beneath the chassis. In this board is placed the standard complement of ham band crystals normally received with the equipment. The upper board is left empty so that the amateur may place whatever additional crystals he may desire up to a total of 14. A front panel switch is added to allow switching between the two crystal boards.

32S-1 Transmitter

30S-1 Linear Amplifier



Collins S/LINE accessories and KWM-2

302C-3 Directional Wattmeter– Measures forward and reflected power on 200 and 2000 watt scales. Coupler unit mounts separate from indicator-control box. Power loss and mismatch introduced by the instrument are negligible.

B312-1 Directional Coupler – The coupler unit from the 302C-3 for amateurs who desire to utilize an optional meter and switch for a customized fixed installation or for a mobile installation.

351E Table Mounts – For mounting the S/Line and KWM-2 on planes, boats, etc. May be fastened to any flat surface. Front clamps attach to the feet of the units for secure hold-down. 351E-1 for 32S-1, 75S-1; 351E-2 for 312B-4, 516F-2; 351E-3 for 312B-3, 351E-4 for KWM-2.

351D-2 Mobile Mount – Provides secure mounting for KWM-2 in most automobiles. Cantilever arms fold out of the way when KWM-2 is removed.

Mating plugs connect power, receive-transmit antenna, noise blanker, antenna and antenna control as KWM-2 slides into place. Cables included.

312B-5 Speaker Console and External PTO– Used with KWM-2 in fixed station operation to provide separate receiving and transmitting control, and directional wattmeter.

399C-1 Speaker and External PTO– Contains speaker and external PTO for separate receiver and transmitter control of KWM-2.

136 Series Noise Blankers – Provide effective reduction of impulse-type noise, particularly ignition noise. 136A-1 for 75S-1; 136B-1 for KWM-1; 136B-2 for KWM-2; 136C-1 for 75A-4.

312B-3 Speaker – Contains a 5" x 7" speaker and connecting cable. Attractively styled to match receiver and transmitter.

516F-2 AC Power Supply– Operates from 115 v ac, 50-60 cps. Provides all voltages for the 32S-1.

516E-1 Power Supply – Operates from 12 v dc. Provides all required voltages for the KWM-2 or 32S-1 and 75S-1 for mobile or portable operation. Transistorized for maximum efficiency and minimum maintenance. The 516E-2, a 28 v dc supply may also be used.

For addresses of Collins dealers or further information and complete specifications on the entire Collins S/Line and accessories, write to: Amateur Sales, Collins Radio Company, Cedar Rapids, Iowa.

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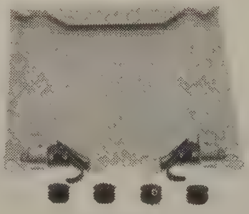
302C-3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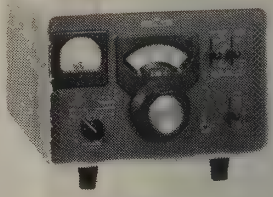
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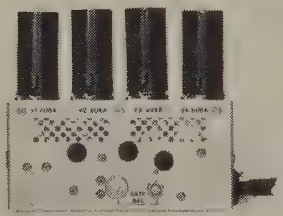
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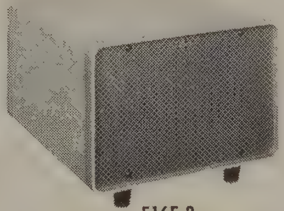
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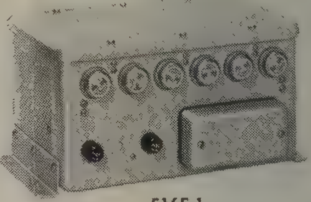
516E-1

AMATEUR SINGLE SIDEBAND

A Collins publication written exclusively for the amateur radio operator. A hard bound book that will be a valuable addition to any ham shack.

This seven-chapter book covers the following areas:

1. Introduction of Single Sideband
2. The Nature of SSB Signals
3. Single Sideband Exciters
4. RF Linear Amplifiers
5. Single Sideband Receivers
6. Tests and Measurements
7. The Amateur SSB Station

Available at your nearest distributor — Price $4.00.

TEN ADVANTAGES:

You get all of these features with Collins S/Line

1. Complete station compatibility
2. Light weight
3. Simplicity and styling
4. Frequency stability
5. Frequency calibration
6. More QSO's per kilocycle
7. Mechanical Filters
8. Dual or single PTO control
9. Automatic load control
10. Negative RF feedback

Collins is the pace setter for amateur radio technology.

074 3105 00 15M—WP—8-64 Printed in U.S.A.

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price list

AMATEUR RADIO EQUIPMENT

effective August 1, 1964

COLLINS

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

AMATEUR EQUIPMENT PRICE SCHEDULE

Type No.	Part No.	Description	Amateur Net Price
		TRANSCEIVERS	
KWM-2	522 1611 00	Transceiver	$1,150.00
KWM-2 with 136B-2	522 1611 012	Transceiver with Noise Blanker	1,296.00
KWM-2A	522 1792 00	Transceiver	1,250.00
KWM-2A with 136B-2	522 1792 011	Transceiver with Noise Blanker	1,396.00
		RECEIVERS	
75S-3B	522 3316 00	Receiver	620.00
75S-3B	522 3316 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	635.00
75S-3C	522 3317 00	Receiver	690.00
75S-3C	522 3317 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	705.00
		TRANSMITTERS	
30L-1	522 2375 00	Linear Amplifier	520.00
30S-1	522 1286 00	Linear Amplifier	1,795.00
32S-3	522 2955 00	Transmitter	750.00 115.
		VHF CONVERTER	
62S-1	522 2376 00	VHF Converter	895.00
		ACCESSORIES	
312B-3	522 1166 00	Speaker (S/Line, KWM-2, 51S-1)	32.00
312B-4	522 1167 00	Speaker Console (S/Line, KWM-2)	195.00
312B-5	522 1668 00	PTO Console (KWM-2)	350.00
MP-1	522 2750 00	14 V DC Power Supply (KWM-2)	198.00

Type No.	Part No.	Description	Amateur Net Price
PM-2	522 2639 004	Portable Power Supply (KWM-2)	$150.00
516E-2	522 0984 005	28 V DC Power Supply (KWM-2)	400.00
516F-2	522 1170 00	AC Power Supply (32S-3, KWM-2)	115.00
DL-1	597 0361 00	Dummy Load	58.00
302C-3	522 1696 00	Directional Wattmeter	130.00
136B-2	522 1661 00	Noise Blanker (KWM-2)	124.00
351D-2	522 1726 00	Mobile Mount (KWM-2)	120.00
351E-1	522 1479 003	Table Mount (32S, 75S)	24.00
351E-2	522 1480 003	Table Mount (516F-2, 312B-4/5)	24.00
351E-3	522 1481 003	Table Mount (312B-3)	24.00
351E-4	522 1482 003	Table Mount (KWM-2)	24.00
351R-1	522 2665 00	Rack Mount (32S, 75S, KWM-2)	32.00
351R-2	522 2666 00	Rack Mount (516F-2, 312B Series)	32.00
399B-4	522 1780 00	Novice Adapters (32S) (less crystals)	40.00
399B-5	522 1781 00	Novice Adapters (KWM-2) (less crystals)	46.00
SM-1	097 5944 00	Fixed Station Microphone	32.00
SM-2	097 5946 00	Fixed Station Microphone	48.00
MM-1	097 5945 00	Mobile Hand Microphone	25.00
MM-2	097 6027 00	Mobile Boom Microphone with Earphone	44.00
CC-2	597 0393 00	Carrying Case (KWM-2,-2A, 30L-1, 51S-1, or 62S-1)	85.00
CC-3	597 0403 00	Carrying Case (312B-4 or 312B-5 & MP-1 or 516E-2 & TD-1 plus spares)	107.00
CP-1	597 0404 00	Crystal Packet	396.00
CT-1	097 6192 00	Cable Trough (KWM-2)	8.00
440E-1	522 2051 00	Cable (MP-1 to KWM-2)	17.00
440F-1	522 2114 00	Cable (Extension Cable 516F-2, PM-2)	17.00

Type No.	Part No.	Description	Amateur Net Price
		MECHANICAL FILTERS	
F455FB-21	526 9448 00	Mechanical Filter (experimental usage)	26.50
X455KQ200	526 7677 00	75S3B/3C	68.00
F455FA-05	526 9494 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-08	526 9446 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-15	526 9495 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-21	526 9427 00	Mechanical Filter (75S-3B/3C, 32S-3)	32.50
F455FA-31	526 9496 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-40	526 9497 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-60	526 9498 00	Mechanical Filter (75S-3B/3C)	47.00
F455Q-5	526 9367 00	Mechanical Filter (75S-1/2)	52.00
F455K-15	526 9168 00	Mechanical Filter (75S-1/2)	60.00
F455Y-21	526 9337 00	Mechanical Filter (75S-1/2, KWM-2/2A, 32S-1/2)	50.60
F455Y-31	526 9338 00	Mechanical Filter (75S-1/2)	50.60
F455Y-40	526 9339 00	Mechanical Filter (75S-1/2)	50.60
F455Y-60	526 9340 00	Mechanical Filter (75S-1/2)	50.60

PRINTED MATERIAL

Description	Part No.	Amateur Net Price
Amateur Single Sideband	523 0720 00	$ 4.00
Instruction Books for KWM-1, KWS-1, 75A-1,-2,-3,-4, 32V-2,-3, 310B-1,-3		5.00
Current Equipment Instruction Books		2.00
All Schematics		.50
Logbooks	097 7629 00	1.00

All prices are exclusive of any federal, state or local sales, use or excise taxes and are subject to change without notice.

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074 3105 00 15M—WP—8-64 Printed in U.S.A.

price lis

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effective August 1, 1964

COLLINS

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

AMATEUR EQUIPMENT PRICE SCHEDULE

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KWM-2 with 136B-2	522 1611 012	Transceiver with Noise Blanker	1,296.00
KWM-2A	522 1792 00	Transceiver	1,250.00
KWM-2A with 136B-2	522 1792 011	Transceiver with Noise Blanker	1,396.00

RECEIVERS

Type No.	Part No.	Description	Amateur Net Price
75S-3B	522 3316 00	Receiver	620.00
75S-3B	522 3316 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	635.00
75S-3C	522 3317 00	Receiver	690.00
75S-3C	522 3317 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	705.00

TRANSMITTERS

Type No.	Part No.	Description	Amateur Net Price
30L-1	522 2375 00	Linear Amplifier	520.00
30S-1	522 1286 00	Linear Amplifier	1,795.00
32S-3	522 2955 00	Transmitter	750.00 155

VHF CONVERTER

Type No.	Part No.	Description	Amateur Net Price
62S-1	522 2376 00	VHF Converter	895.00

ACCESSORIES

Type No.	Part No.	Description	Amateur Net Price
312B-3	522 1166 00	Speaker (S/Line, KWM-2, 51S-1)	32.00
312B-4	522 1167 00	Speaker Console (S/Line, KWM-2)	195.00
312B-5	522 1668 00	PTO Console (KWM-2)	350.00
MP-1	522 2750 00	14 V DC Power Supply (KWM-2)	198.00

Type No.	Part No.	Description	Amateur Net Price
PM-2	522 2639 004	Portable Power Supply (KWM-2)	$150.00
516E-2	522 0984 005	28 V DC Power Supply (KWM-2)	400.00
516F-2	522 1170 00	AC Power Supply (32S-3, KWM-2)	115.00
DL-1	597 0361 00	Dummy Load	58.00
302C-3	522 1696 00	Directional Wattmeter	130.00
136B-2	522 1661 00	Noise Blanker (KWM-2)	124.00
351D-2	522 1726 00	Mobile Mount (KWM-2)	120.00
351E-1	522 1479 003	Table Mount (32S, 75S)	24.00
351E-2	522 1480 003	Table Mount (516F-2, 312B-4/5)	24.00
351E-3	522 1481 003	Table Mount (312B-3)	24.00
351E-4	522 1482 003	Table Mount (KWM-2)	24.00
351R-1	522 2665 00	Rack Mount (32S, 75S, KWM-2)	32.00
351R-2	522 2666 00	Rack Mount (516F-2, 312B Series)	32.00
399B-4	522 1780 00	Novice Adapters (32S) (less crystals)	40.00
399B-5	522 1781 00	Novice Adapters (KWM-2) (less crystals)	46.00
SM-1	097 5944 00	Fixed Station Microphone	32.00
SM-2	097 5946 00	Fixed Station Microphone	48.00
MM-1	097 5945 00	Mobile Hand Microphone	25.00
MM-2	097 6027 00	Mobile Boom Microphone with Earphone	44.00
CC-2	597 0393 00	Carrying Case (KWM-2,-2A, 30L-1, 51S-1, or 62S-1)	85.00
CC-3	597 0403 00	Carrying Case (312B-4 or 312B-5 & MP-1 or 516E-2 & TD-1 plus spares)	107.00
CP-1	597 0404 00	Crystal Packet	396.00
CT-1	097 6192 00	Cable Trough (KWM-2)	8.00
440E-1	522 2051 00	Cable (MP-1 to KWM-2)	17.00
440F-1	522 2114 00	Cable (Extension Cable 516F-2, PM-2)	17.00

MECHANICAL FILTERS

Type No.	Part No.	Description	Amateur Net Price
F455FB-21	526 9448 00	Mechanical Filter (experimental usage)	26.50
X455KQ200	526 7677 00	75S3B/3C	68.00
F455FA-05	526 9494 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-08	526 9446 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-15	526 9495 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-21	526 9427 00	Mechanical Filter (75S-3B/3C, 32S-3)	32.50
F455FA-31	526 9496 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-40	526 9497 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-60	526 9498 00	Mechanical Filter (75S-3B/3C)	47.00
F455Q-5	526 9367 00	Mechanical Filter (75S-1/2)	52.00
F455K-15	526 9168 00	Mechanical Filter (75S-1/2)	60.00
F455Y-21	526 9337 00	Mechanical Filter (75S-1/2, KWM-2/2A, 32S-1/2)	50.60
F455Y-31	526 9338 00	Mechanical Filter (75S-1/2)	50.60
F455Y-40	526 9339 00	Mechanical Filter (75S-1/2)	50.60
F455Y-60	526 9340 00	Mechanical Filter (75S-1/2)	50.60

PRINTED MATERIAL

Description	Part No.	Amateu Net Pric
Amateur Single Sideband	523 0720 00	$ 4.0
Instruction Books for KWM-1, KWS-1, 75A-1,-2,-3,-4, 32V-2,-3, 310B-1,-3		5.0
Current Equipment Instruction Books		2.0
All Schematics		.5
Logbooks	097 7629 00	1.0

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4. RF Linear Amplifiers
5. Single Sideband Receivers
6. Tests and Measurements
7. The Amateur SSB Station

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1. Complete station compatibility
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3. Simplicity and styling
4. Frequency stability
5. Frequency calibration
6. More QSO's per kilocycle
7. Mechanical Filters
8. Dual or single PTO control
9. Automatic load control
10. Negative RF feedback

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074 3105 00 15M—WP—8-64 Printed in U.S.A.

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AMATEUR RADIO
EQUIPMENT

effective August 1, 1964

COLLINS

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

AMATEUR EQUIPMENT PRICE SCHEDULE

ype No.	Part No.	Description	Amateur Net Price
		TRANSCEIVERS	
WM-2	522 1611 00	Transceiver	$1,150.00
WM-2 with 36B-2	522 1611 012	Transceiver with Noise Blanker	1,296.00
WM-2A	522 1792 00	Transceiver	1,250.00
WM-2A with 36B-2	522 1792 011	Transceiver with Noise Blanker	1,396.00
		RECEIVERS	
5S-3B	522 3316 00	Receiver	620.00
5S-3B	522 3316 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	635.00
5S-3C	522 3317 00	Receiver	690.00
5S-3C	522 3317 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	705.00
		TRANSMITTERS	
0L-1	522 2375 00	Linear Amplifier	520.00
0S-1	522 1286 00	Linear Amplifier	1,795.00
2S-3	522 2955 00	Transmitter	750.00 115.
		VHF CONVERTER	
2S-1	522 2376 00	VHF Converter	895.00
		ACCESSORIES	
312B-3	522 1166 00	Speaker (S/Line, KWM-2, 51S-1)	32.00
312B-4	522 1167 00	Speaker Console (S/Line, KWM-2)	195.00
312B-5	522 1668 00	PTO Console (KWM-2)	350.00
MP-1	522 2750 00	14 V DC Power Supply (KWM-2)	198.00

Type No.	Part No.	Description	Amateur Net Price
PM-2	522 2639 004	Portable Power Supply (KWM-2)	$150.00
516E-2	522 0984 005	28 V DC Power Supply (KWM-2)	400.00
516F-2	522 1170 00	AC Power Supply (32S-3, KWM-2)	115.00
DL-1	597 0361 00	Dummy Load	58.00
302C-3	522 1696 00	Directional Wattmeter	130.00
136B-2	522 1661 00	Noise Blanker (KWM-2)	124.00
351D-2	522 1726 00	Mobile Mount (KWM-2)	120.00
351E-1	522 1479 003	Table Mount (32S, 75S)	24.00
351E-2	522 1480 003	Table Mount (516F-2, 312B-4/5)	24.00
351E-3	522 1481 003	Table Mount (312B-3)	24.00
351E-4	522 1482 003	Table Mount (KWM-2)	24.00
351R-1	522 2665 00	Rack Mount (32S, 75S, KWM-2)	32.00
351R-2	522 2666 00	Rack Mount (516F-2, 312B Series)	32.00
399B-4	522 1780 00	Novice Adapters (32S) (less crystals)	40.00
399B-5	522 1781 00	Novice Adapters (KWM-2) (less crystals)	46.00
SM-1	097 5944 00	Fixed Station Microphone	32.00
SM-2	097 5946 00	Fixed Station Microphone	48.00
MM-1	097 5945 00	Mobile Hand Microphone	25.00
MM-2	097 6027 00	Mobile Boom Microphone with Earphone	44.00
CC-2	597 0393 00	Carrying Case (KWM-2,-2A, 30L-1, 51S-1, or 62S-1)	85.00
CC-3	597 0403 00	Carrying Case (312B-4 or 312B-5 & MP-1 or 516E-2 & TD-1 plus spares)	107.00
CP-1	597 0404 00	Crystal Packet	396.00
CT-1	097 6192 00	Cable Trough (KWM-2)	8.00
440E-1	522 2051 00	Cable (MP-1 to KWM-2)	17.00
440F-1	522 2114 00	Cable (Extension Cable 516F-2, PM-2)	17.00

Type No.	Part No.	Description	Amateur Net Price
		MECHANICAL FILTERS	
F455FB-21	526 9448 00	Mechanical Filter (experimental usage)	26.50
X455KQ200	526 7677 00	75S3B/3C	68.00
F455FA-05	526 9494 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-08	526 9446 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-15	526 9495 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-21	526 9427 00	Mechanical Filter (75S-3B/3C, 32S-3)	32.50
F455FA-31	526 9496 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-40	526 9497 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-60	526 9498 00	Mechanical Filter (75S-3B/3C)	47.00
F455Q-5	526 9367 00	Mechanical Filter (75S-1/2)	52.00
F455K-15	526 9168 00	Mechanical Filter (75S-1/2)	60.00
F455Y-21	526 9337 00	Mechanical Filter (75S-1/2, KWM-2/2A, 32S-1/2)	50.60
F455Y-31	526 9338 00	Mechanical Filter (75S-1/2)	50.60
F455Y-40	526 9339 00	Mechanical Filter (75S-1/2)	50.60
F455Y-60	526 9340 00	Mechanical Filter (75S-1/2)	50.60

PRINTED MATERIAL

Description	Part No.	Amateur Net Price
Amateur Single Sideband	523 0720 00	$ 4.00
Instruction Books for KWM-1, KWS-1, 75A-1,-2,-3,-4, 32V-2,-3, 310B-1,-3		5.00
Current Equipment Instruction Books		2.00
All Schematics		.50
Logbooks	097 7629 00	1.00

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AMATEUR RADIC
EQUIPMENT

effective August 1, 1964

COLLINS

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

AMATEUR EQUIPMENT PRICE SCHEDULE

Type No.	Part No.	Description	Amateur Net Price
		TRANSCEIVERS	
KWM-2	522 1611 00	Transceiver	$1,150.00
KWM-2 with 136B-2	522 1611 012	Transceiver with Noise Blanker	1,296.00
KWM-2A	522 1792 00	Transceiver	1,250.00
KWM-2A with 136B-2	522 1792 011	Transceiver with Noise Blanker	1,396.00
		RECEIVERS	
75S-3B	522 3316 00	Receiver	620.00
75S-3B	522 3316 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	635.00
75S-3C	522 3317 00	Receiver	690.00
75S-3C	522 3317 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	705.00
		TRANSMITTERS	
30L-1	522 2375 00	Linear Amplifier	520.00
30S-1	522 1286 00	Linear Amplifier	1,795.00
32S-3	522 2955 00	Transmitter	750.00 155.
		VHF CONVERTER	
62S-1	522 2376 00	VHF Converter	895.00
		ACCESSORIES	
312B-3	522 1166 00	Speaker (S/Line, KWM-2, 51S-1)	32.00
312B-4	522 1167 00	Speaker Console (S/Line, KWM-2)	195.00
312B-5	522 1668 00	PTO Console (KWM-2)	350.00
MP-1	522 2750 00	14 V DC Power Supply (KWM-2)	198.00

Type No.	Part No.	Description	Amateur Net Price
PM-2	522 2639 004	Portable Power Supply (KWM-2)	$150.00
516E-2	522 0984 005	28 V DC Power Supply (KWM-2)	400.00
516F-2	522 1170 00	AC Power Supply (32S-3, KWM-2)	115.00
DL-1	597 0361 00	Dummy Load	58.00
302C-3	522 1696 00	Directional Wattmeter	130.00
136B-2	522 1661 00	Noise Blanker (KWM-2)	124.00
351D-2	522 1726 00	Mobile Mount (KWM-2)	120.00
351E-1	522 1479 003	Table Mount (32S, 75S)	24.00
351E-2	522 1480 003	Table Mount (516F-2, 312B-4/5)	24.00
351E-3	522 1481 003	Table Mount (312B-3)	24.00
351E-4	522 1482 003	Table Mount (KWM-2)	24.00
351R-1	522 2665 00	Rack Mount (32S, 75S, KWM-2)	32.00
351R-2	522 2666 00	Rack Mount (516F-2, 312B Series)	32.00
399B-4	522 1780 00	Novice Adapters (32S) (less crystals)	40.00
399B-5	522 1781 00	Novice Adapters (KWM-2) (less crystals)	46.00
SM-1	097 5944 00	Fixed Station Microphone	32.00
SM-2	097 5946 00	Fixed Station Microphone	48.00
MM-1	097 5945 00	Mobile Hand Microphone	25.00
MM-2	097 6027 00	Mobile Boom Microphone with Earphone	44.00
CC-2	597 0393 00	Carrying Case (KWM-2,-2A, 30L-1, 51S-1, or 62S-1)	85.00
CC-3	597 0403 00	Carrying Case (312B-4 or 312B-5 & MP-1 or 516E-2 & TD-1 plus spares)	107.00
CP-1	597 0404 00	Crystal Packet	396.00
CT-1	097 6192 00	Cable Trough (KWM-2)	8.00
440E-1	522 2051 00	Cable (MP-1 to KWM-2)	17.00
440F-1	522 2114 00	Cable (Extension Cable 516F-2, PM-2)	17.00

Type No.	Part No.	Description	Amateur Net Price
		MECHANICAL FILTERS	
F455FB-21	526 9448 00	Mechanical Filter (experimental usage)	26.50
X455KQ200	526 7677 00	75S3B/3C	68.00
F455FA-05	526 9494 00	Mechanical Filter (75S-3B/3C)	57.5
F455FA-08	526 9446 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-15	526 9495 00	Mechanical Filter (75S-3B/3C)	57.5
F455FA-21	526 9427 00	Mechanical Filter (75S-3B/3C, 32S-3)	32.50
F455FA-31	526 9496 00	Mechanical Filter (75S-3B/3C)	47.0
F455FA-40	526 9497 00	Mechanical Filter (75S-3B/3C)	47.0
F455FA-60	526 9498 00	Mechanical Filter (75S-3B/3C)	47.0
F455Q-5	526 9367 00	Mechanical Filter (75S-1/2)	52.0
F455K-15	526 9168 00	Mechanical Filter (75S-1/2)	60.0
F455Y-21	526 9337 00	Mechanical Filter (75S-1/2, KWM-2/2A, 32S-1/2)	50.6
F455Y-31	526 9338 00	Mechanical Filter (75S-1/2)	50.6
F455Y-40	526 9339 00	Mechanical Filter (75S-1/2)	50.6
F455Y-60	526 9340 00	Mechanical Filter (75S-1/2)	50.6

PRINTED MATERIAL

Description	Part No.	Amateu Net Pric
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Instruction Books for KWM-1, KWS-1, 75A-1,-2,-3,-4, 32V-2,-3, 310B-1,-3		5.0
Current Equipment Instruction Books		2.0
All Schematics		.5
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AMATEUR RADIO EQUIPMENT

effective August 1, 1964

COLLINS

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

AMATEUR EQUIPMENT PRICE SCHEDULE

Type No.	Part No.	Description	Amateur Net Price
		TRANSCEIVERS	
KWM-2	522 1611 00	Transceiver	$1,150.00
KWM-2 with 136B-2	522 1611 012	Transceiver with Noise Blanker	1,296.00
KWM-2A	522 1792 00	Transceiver	1,250.00
KWM-2A with 136B-2	522 1792 011	Transceiver with Noise Blanker	1,396.00
		RECEIVERS	
75S-3B	522 3316 00	Receiver	620.00
75S-3B	522 3316 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	635.00
75S-3C	522 3317 00	Receiver	690.00
75S-3C	522 3317 011	Receiver with AM filter socket wired in to accept FA series mechanical filters. Normal transformer coupling wired out of circuit.	705.00
		TRANSMITTERS	
30L-1	522 2375 00	Linear Amplifier	520.00
30S-1	522 1286 00	Linear Amplifier	1,795.00
32S-3	522 2955 00	Transmitter	750.00 115.
		VHF CONVERTER	
62S-1	522 2376 00	VHF Converter	895.00
		ACCESSORIES	
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312B-4	522 1167 00	Speaker Console (S/Line, KWM-2)	195.00
312B-5	522 1668 00	PTO Console (KWM-2)	350.00
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516F-2	522 1170 00	AC Power Supply (32S-3, KWM-2)	115.00
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302C-3	522 1696 00	Directional Wattmeter	130.00
136B-2	522 1661 00	Noise Blanker (KWM-2)	124.00
351D-2	522 1726 00	Mobile Mount (KWM-2)	120.00
351E-1	522 1479 003	Table Mount (32S, 75S)	24.00
351E-2	522 1480 003	Table Mount (516F-2, 312B-4/5)	24.00
351E-3	522 1481 003	Table Mount (312B-3)	24.00
351E-4	522 1482 003	Table Mount (KWM-2)	24.00
351R-1	522 2665 00	Rack Mount (32S, 75S, KWM-2)	32.00
351R-2	522 2666 00	Rack Mount (516F-2, 312B Series)	32.00
399B-4	522 1780 00	Novice Adapters (32S) (less crystals)	40.00
399B-5	522 1781 00	Novice Adapters (KWM-2) (less crystals)	46.00
SM-1	097 5944 00	Fixed Station Microphone	32.00
SM-2	097 5946 00	Fixed Station Microphone	48.00
MM-1	097 5945 00	Mobile Hand Microphone	25.00
MM-2	097 6027 00	Mobile Boom Microphone with Earphone	44.00
CC-2	597 0393 00	Carrying Case (KWM-2,-2A, 30L-1, 51S-1, or 62S-1)	85.00
CC-3	597 0403 00	Carrying Case (312B-4 or 312B-5 & MP-1 or 516E-2 & TD-1 plus spares)	107.00
CP-1	597 0404 00	Crystal Packet	396.00
CT-1	097 6192 00	Cable Trough (KWM-2)	8.00
440E-1	522 2051 00	Cable (MP-1 to KWM-2)	17.00
440F-1	522 2114 00	Cable (Extension Cable 516F-2, PM-2)	17.00

Type No.	Part No.	Description	Amateur Net Price
		MECHANICAL FILTERS	
F455FB-21	526 9448 00	Mechanical Filter (experimental usage)	26.50
X455KQ200	526 7677 00	75S3B/3C	68.00
F455FA-05	526 9494 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-08	526 9446 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-15	526 9495 00	Mechanical Filter (75S-3B/3C)	57.50
F455FA-21	526 9427 00	Mechanical Filter (75S-3B/3C, 32S-3)	32.50
F455FA-31	526 9496 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-40	526 9497 00	Mechanical Filter (75S-3B/3C)	47.00
F455FA-60	526 9498 00	Mechanical Filter (75S-3B/3C)	47.00
F455Q-5	526 9367 00	Mechanical Filter (75S-1/2)	52.00
F455K-15	526 9168 00	Mechanical Filter (75S-1/2)	60.00
F455Y-21	526 9337 00	Mechanical Filter (75S-1/2, KWM-2/2A, 32S-1/2)	50.60
F455Y-31	526 9338 00	Mechanical Filter (75S-1/2)	50.60
F455Y-40	526 9339 00	Mechanical Filter (75S-1/2)	50.60
F455Y-60	526 9340 00	Mechanical Filter (75S-1/2)	50.60

PRINTED MATERIAL

Description	Part No.	Amateu Net Pric
Amateur Single Sideband	523 0720 00	$ 4.0
Instruction Books for KWM-1, KWS-1, 75A-1,-2,-3,-4, 32V-2,-3, 310B-1,-3		5.0
Current Equipment Instruction Books		2.0
All Schematics		.5
Logbooks	097 7629 00	1.0

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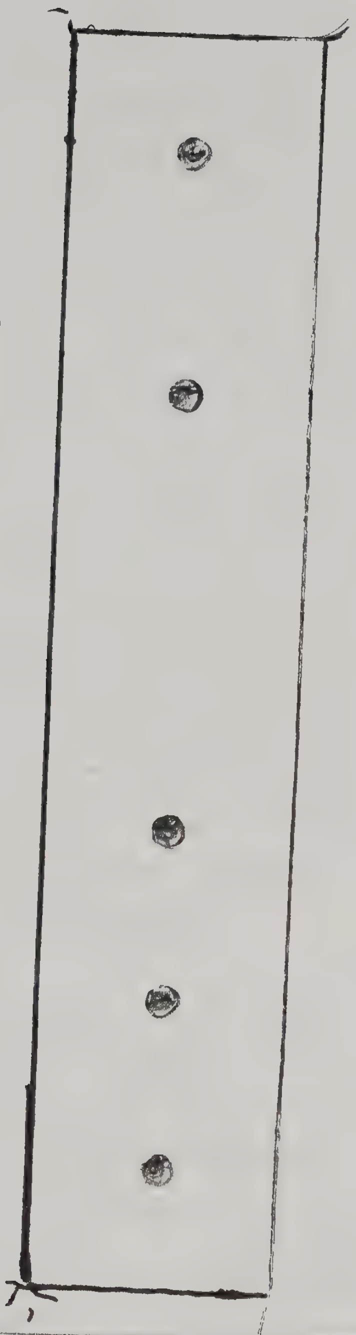

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MTG
BAR

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exACT
TRACE
of
THE BAR

ARE COLLINS S-LINE AND KWM-2"S" METERS REALLY "SCOTCH"?

K. R. Stanley

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The basic ideas that have been presented also apply to the KWM-2 "S" meter. However, since this meter is actually a multimeter, a separate db and S unit scale was not feasible. Therefore, the meter is calibrated from 0-9 in S units for approximately one-half of the scale. It is then marked in 10 db increments above S-9 for the upper half scale.

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COLLINS RADIO CO.
Cedar Rapids, Iowa

model | specifications SM-3 microphone

collins SM-3 specifications

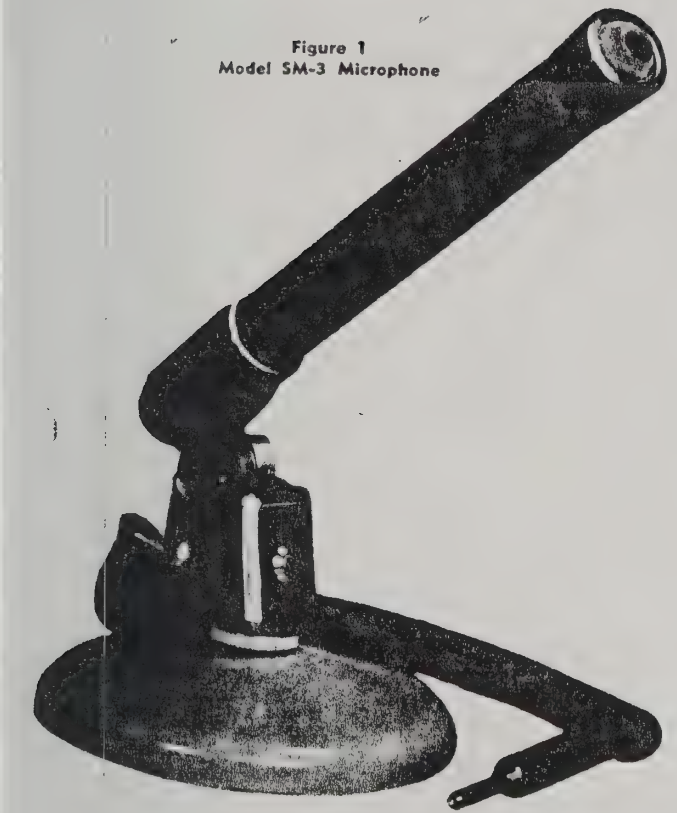

Figure 1
Model SM-3 Microphone

GENERAL:

The Collins SM-3 microphone is designed for use with Collins single-sideband equipment. The microphone element has a diaphragm of "Dynaflex" which effects a sensitive, yet blast proof, high quality speech reproduction.

FREQUENCY RESPONSE:

The Collins SM-3 is a pressure operated dynamic microphone with a frequency response tailored for maximum speech intelligibility when used with Collins single-sideband equipment. The effective response is from 250 to 3,500 c.p.s. (see figure 2).

SPECIFICATIONS:

TYPE:	Pressure operated dynamic.
IMPEDANCE:	100,000 ohms.
FREQUENCE RESPONSE:	250-3,500 c.p.s.
OUTPUT LEVEL:	-50 d b. below 1 volt/dyne/cm
POLAR PATTERN:	Essentially non-directional
CABLE:	The model SM-3 is equipped with an 11" retracted, five foot extended, koiled kord.
CONNECTOR:	PJ-068 plug on cable free end.
CASE:	Combination aluminum tube and die cast zinc alloy coupler section.
FINISH:	Collins grey with chrome plated trim.
MOUNTING:	Friction swivel permits 80° swing. Standard ⅝"-27 thread.
DIMENSIONS:	1⅛" maximum diameter. 8¾" long (less cable connector).
WEIGHT:	14 oz. less cable and stand..
STAND:	Matching stand is supplied with the Collins SM-3

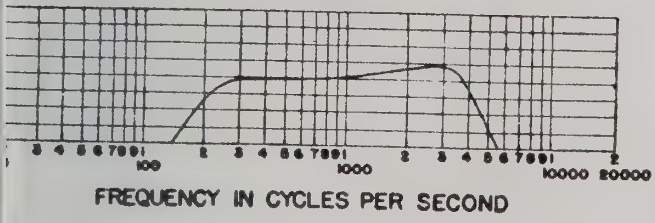

Figure 2—Response Curve

GUARANTEE:

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COLLINS Cedar Rapids, Iowa, U. S. A.

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model

specifications

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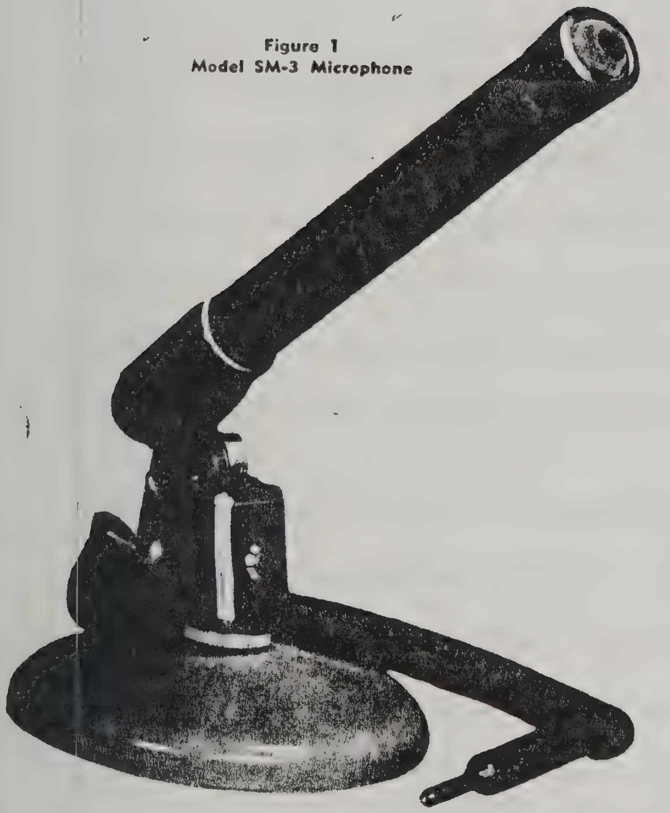

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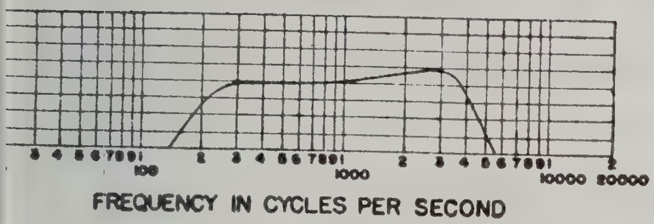

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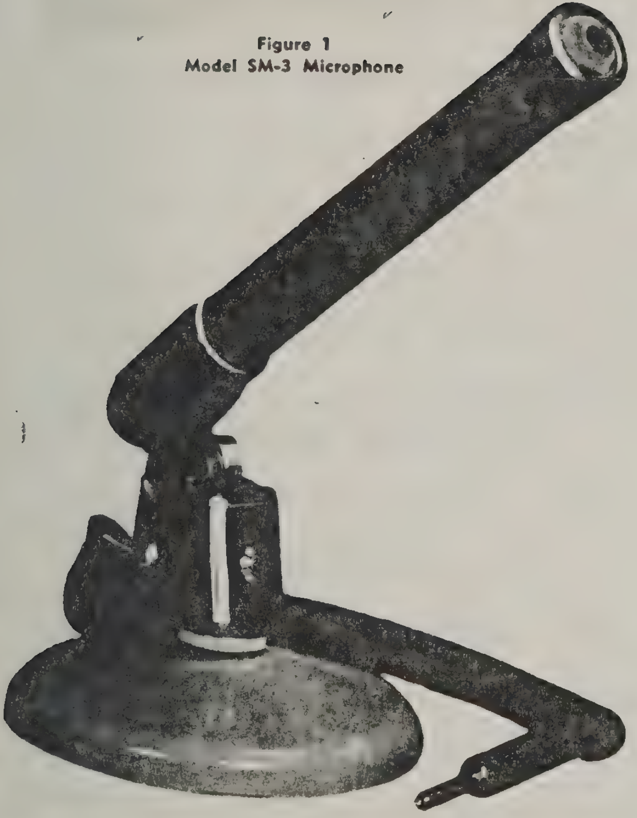

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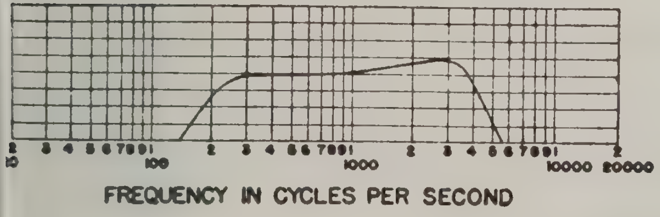

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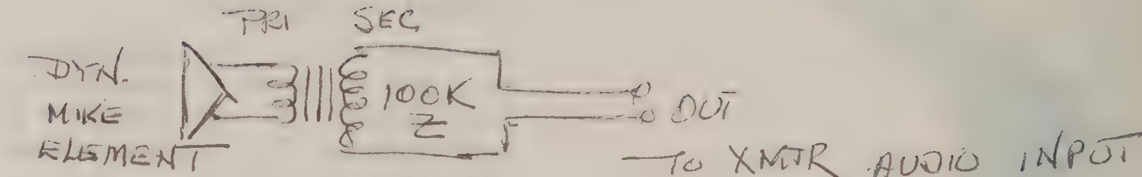
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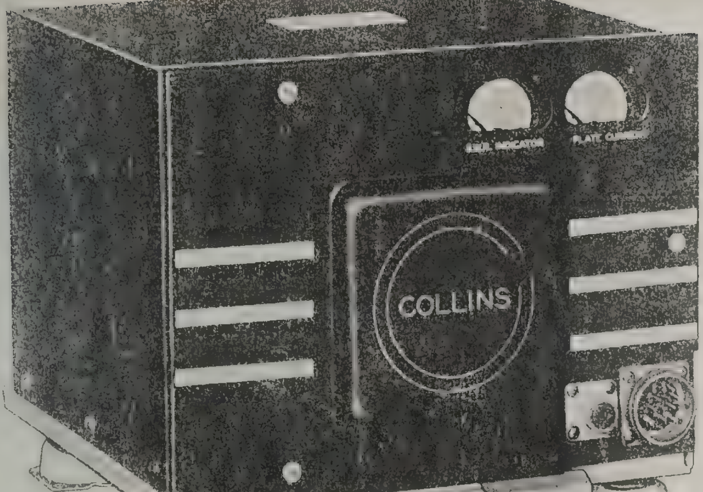
813 Modulated by
Pair 811A's



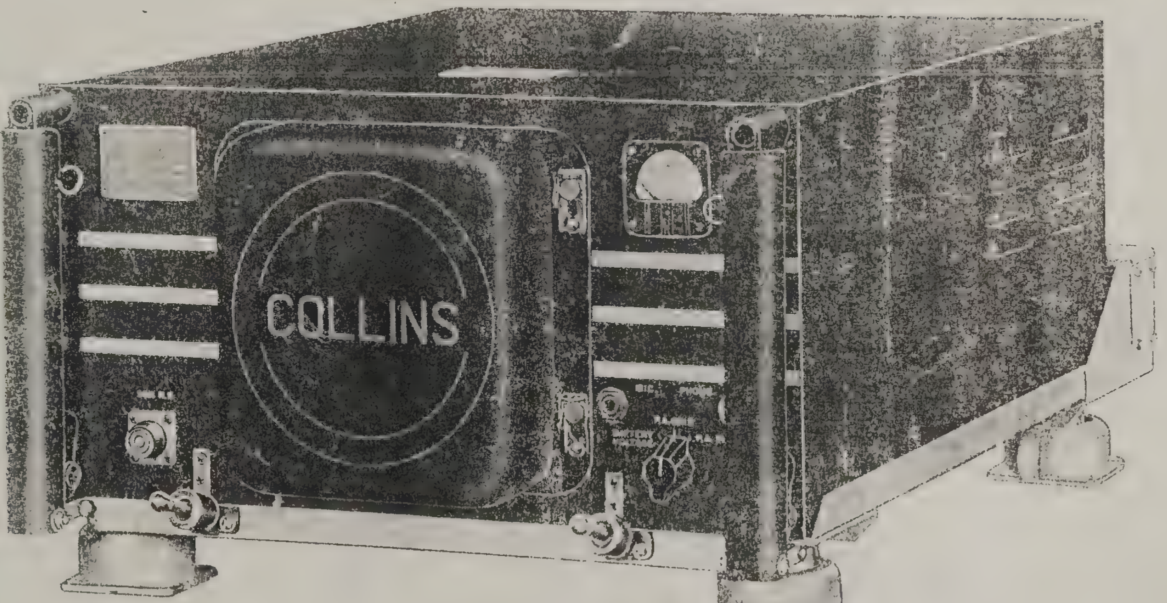


Figure 1-1. Model 18S-4 Radio Equipment

Upper Left: Type 180K-3 Antenna Matching Network on Type 350D-3 Shockmount
Lower Right: Type 18S-4 Transmitter-Receiver on Type 350C-5 Shockmount

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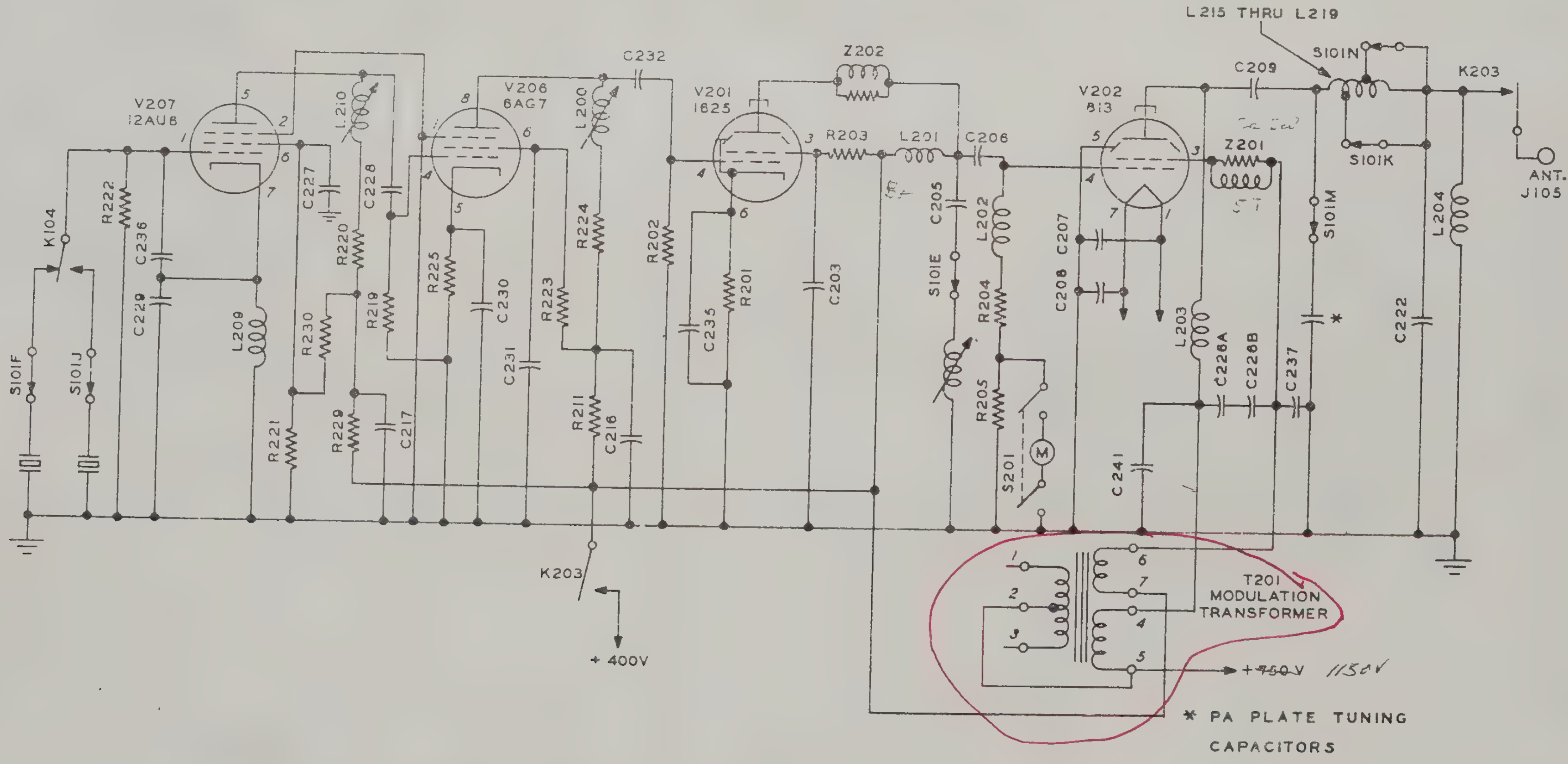


Figure 4-6. Transmitter Section Schematic Diagram

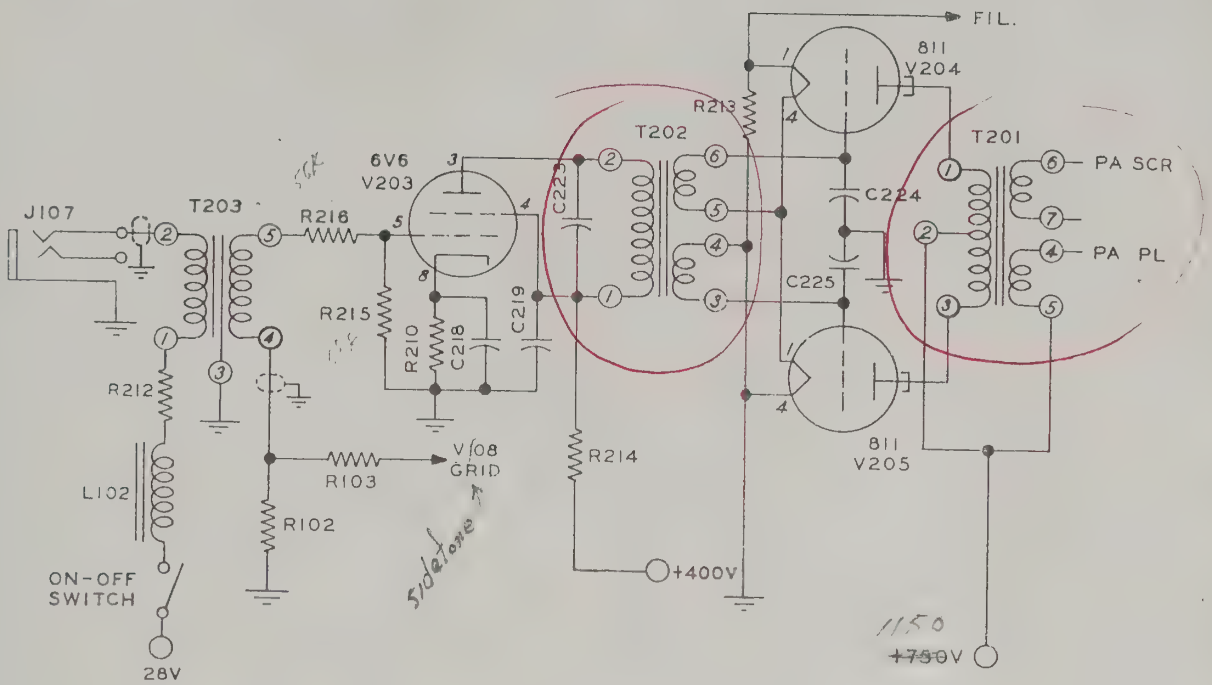


Figure 4-7. Speech Amplifier, Modulator Schematic Diagram

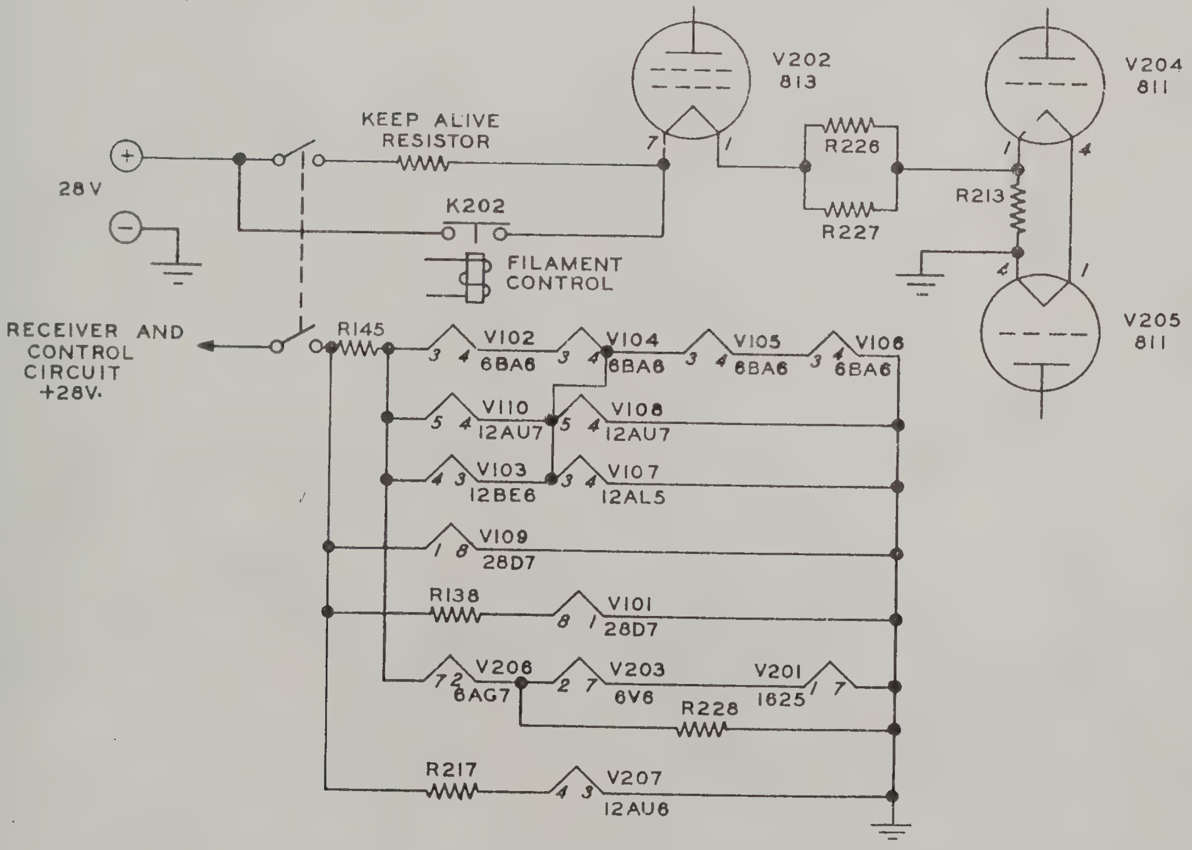


Figure 4-8. Filament Circuit Schematic Diagram

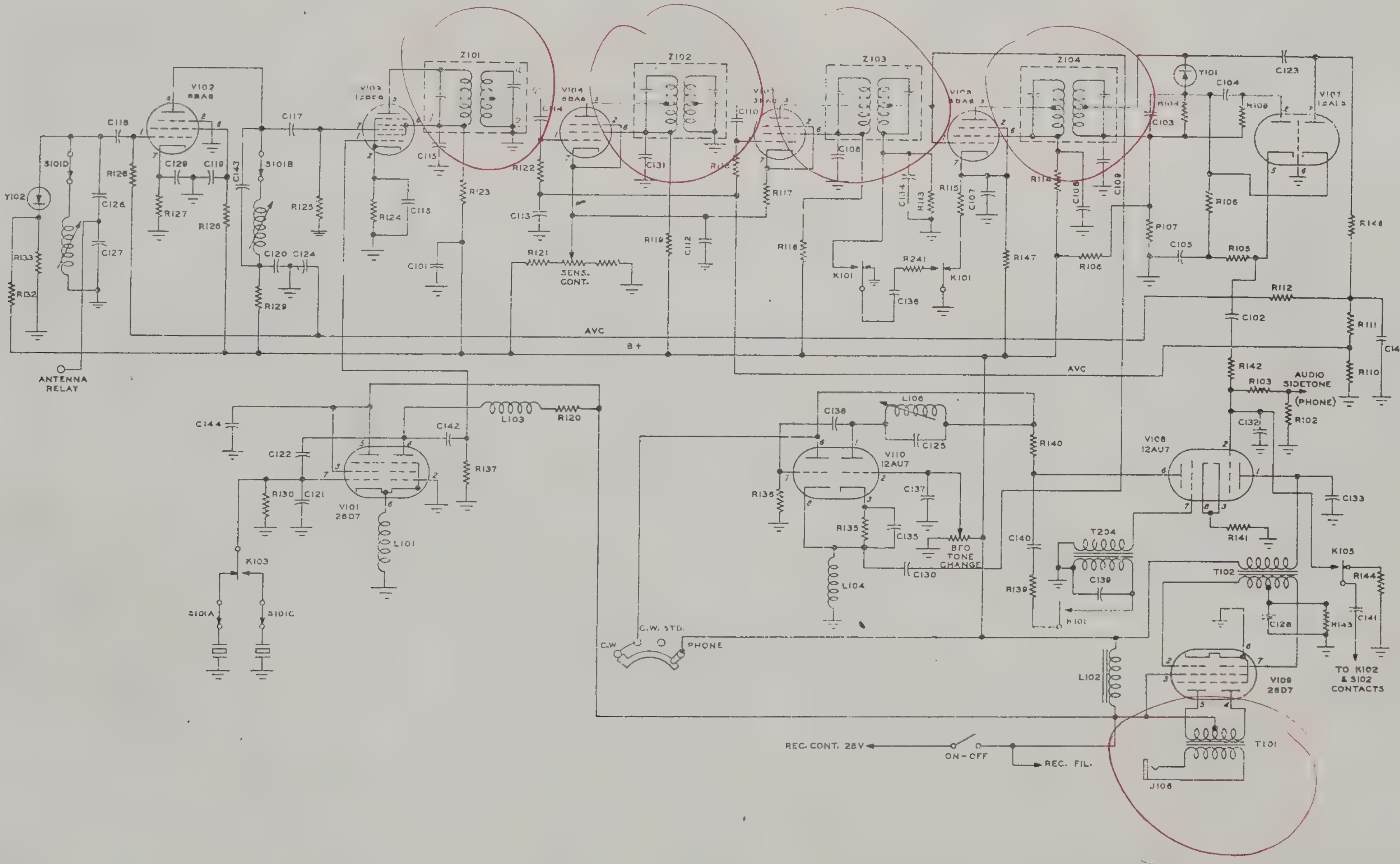
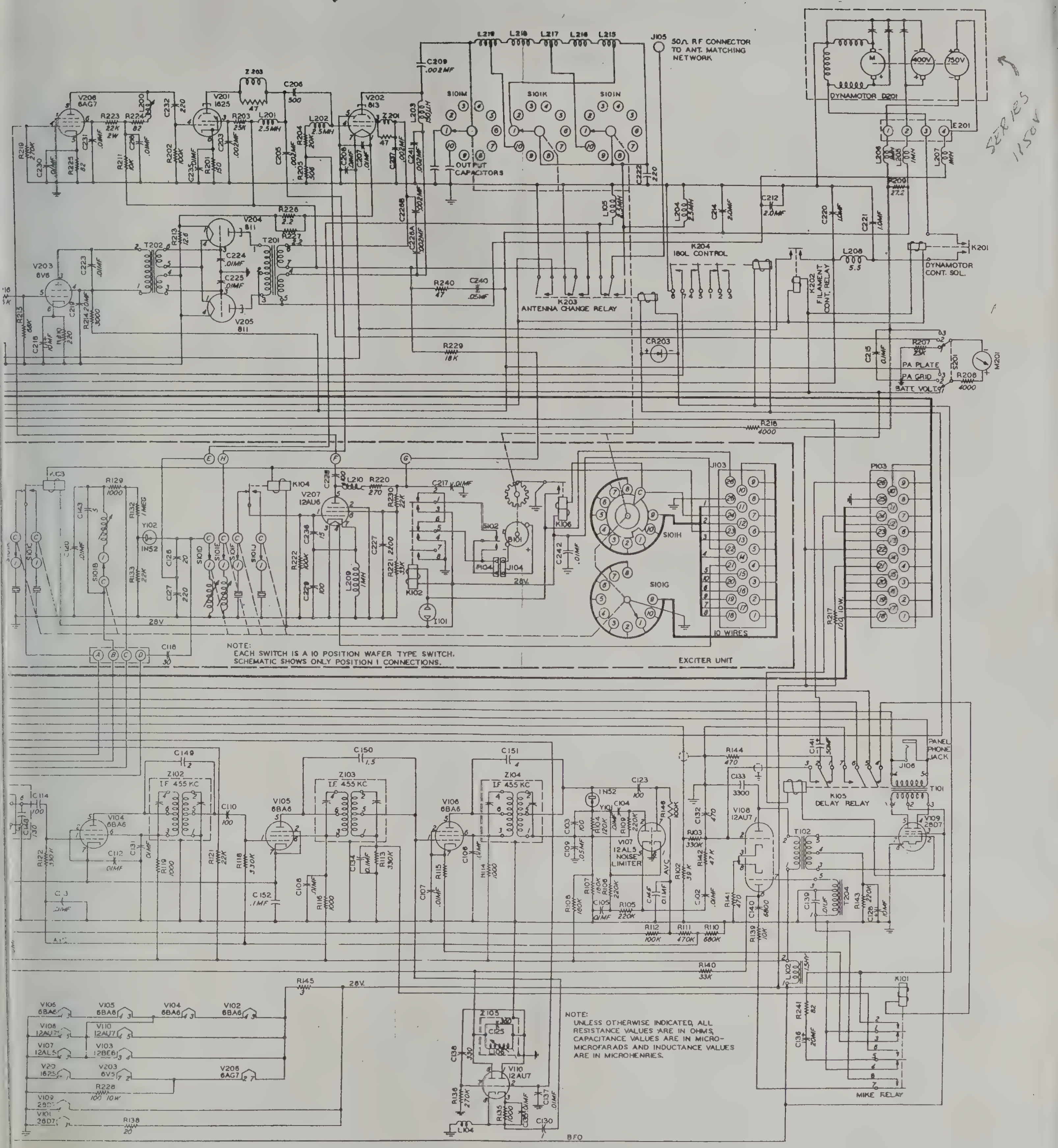


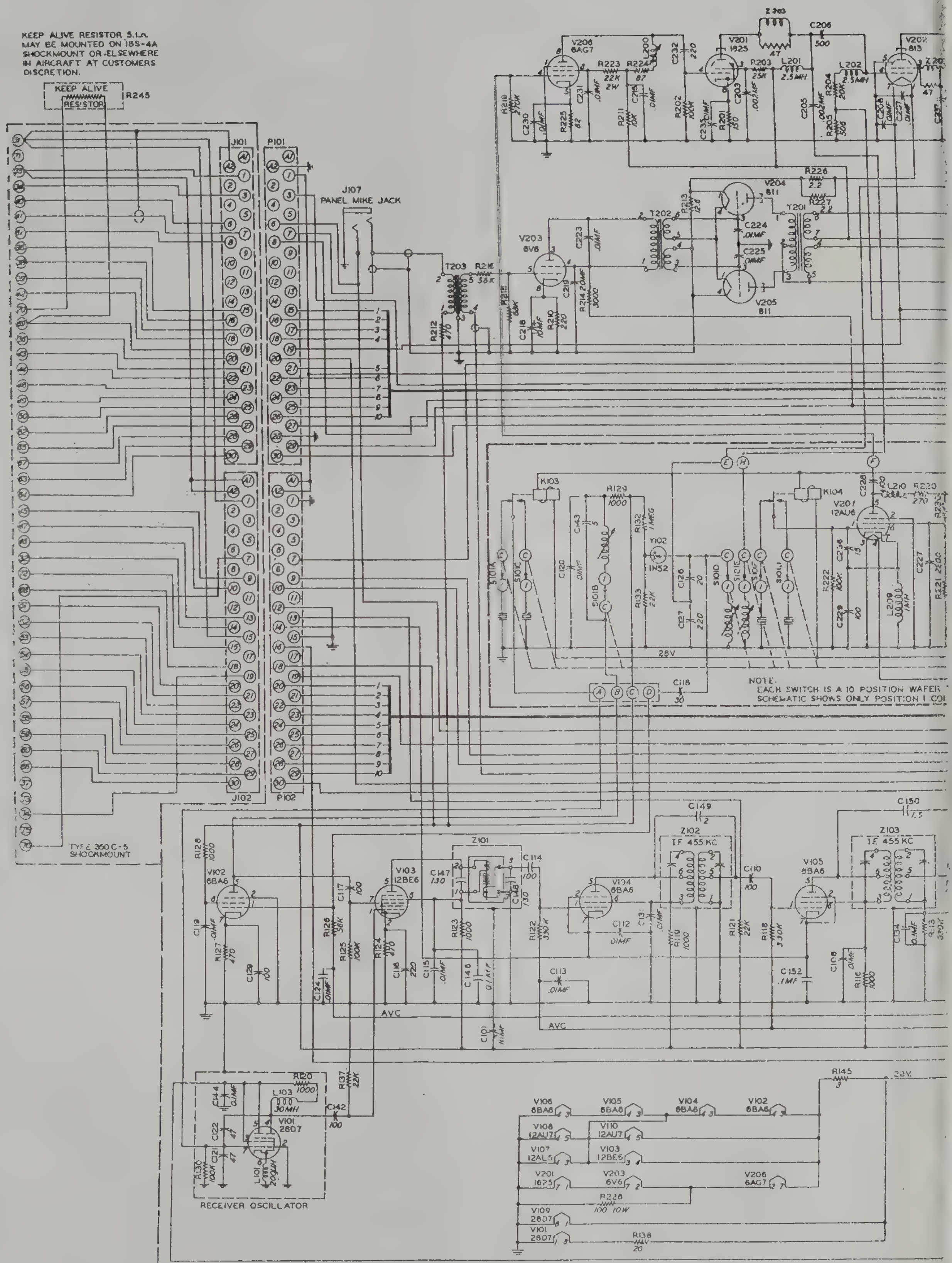
Figure 4-9. 18S-4 Receiver Section Schematic Diagram



NOTE:
EACH SWITCH IS A 10 POSITION WAFER TYPE SWITCH.
SCHEMATIC SHOWS ONLY POSITION 1 CONNECTIONS.

NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICROFARADS AND INDUCTANCE VALUES ARE IN MICROHENRIES.

Figure 8-7C. Model 18S-4A Radio Equipment,
Over-all Schematic



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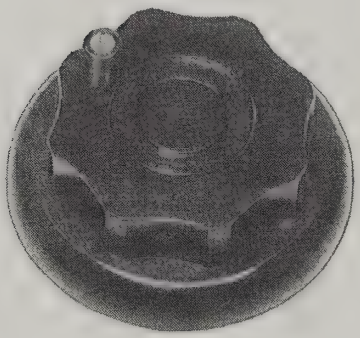
Revised 1 July 1955. Replace

INSTRUCTION BOOK

COLLINS VERNIER TUNING KNOB



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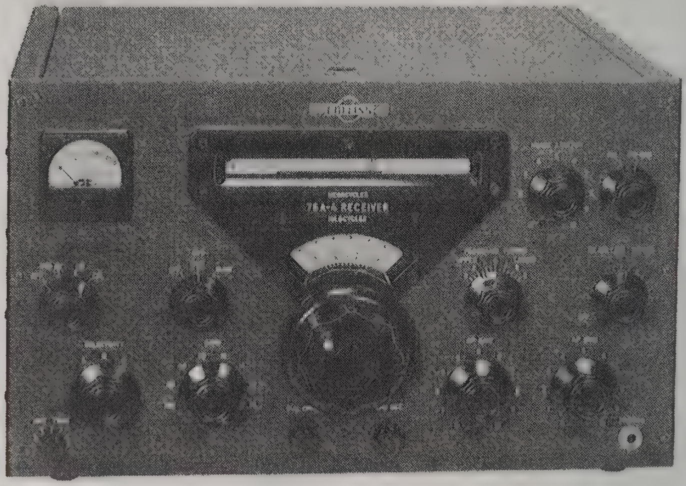

Figure 1. Tuning Knob Mounted on 75A-4 Receiver

I. GENERAL DESCRIPTION

The Vernier Tuning Knob (Collins part number 541 6291 00) is specifically designed for use with the Collins 75A-4 Receiver; however, it is perfectly adapted for use with such other units as the KWS-1, 32V Series, 51J Series, KW-1, 310B Series, and 30K-1. The only requirement is that the shaft to be turned is 1/4 inch in diameter and that it protrudes at least 7/8 inch from the front panel.

The tuning knob is made of black plastic. The gearing mechanism is constructed of brass, aluminum, stainless steel, and other corrosion-resistant materials. The construction is such that it can be readily taken apart for cleaning and lubricating. The gears are machine-cut and spring loaded to eliminate backlash and are designed to obtain a 4 to 1 speed reduction.

II. INSTALLATION ON A TYPE 75A-4 RECEIVER.

The Vernier Tuning Knob is shipped in two pieces; the vernier mechanism and the knob. Check the knob and ring gear to make certain the setscrews are in place. If they are missing, search the packing material.

Use the following procedure to install the Vernier Tuning Knob Assembly.

1. Refer to figure 2. Using the knob setscrew wrench included with the original purchase of the 75A-4 Receiver, remove the old tuning knob to expose the tuning shaft front bearing plate.

2. Remove the two screws securing the front bearing plate and save them. Slide the front bearing plate off the tuning shaft and discard it. The frame of the vernier mechanism of the new knob includes a new front bearing for the tuning shaft.

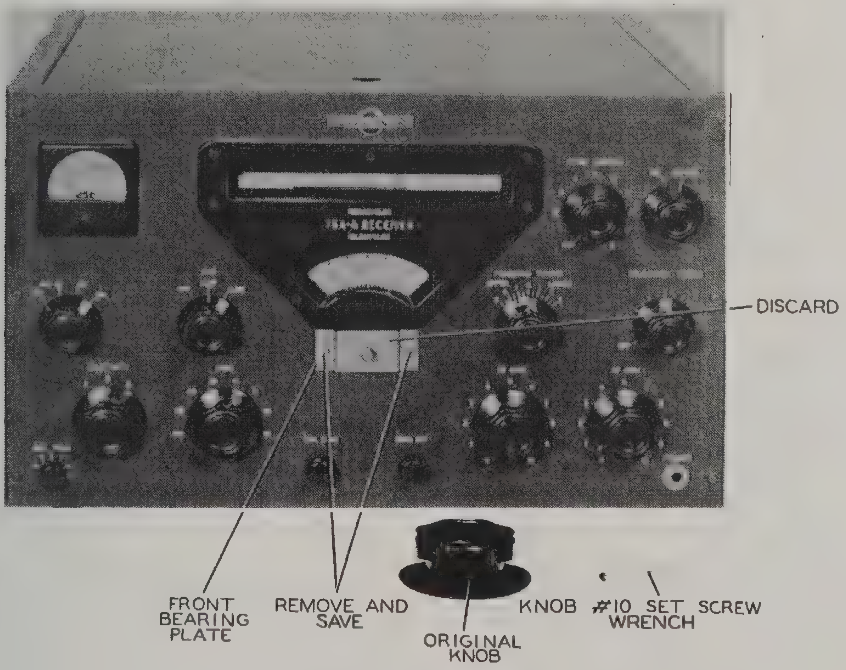

Figure 2. Step 1

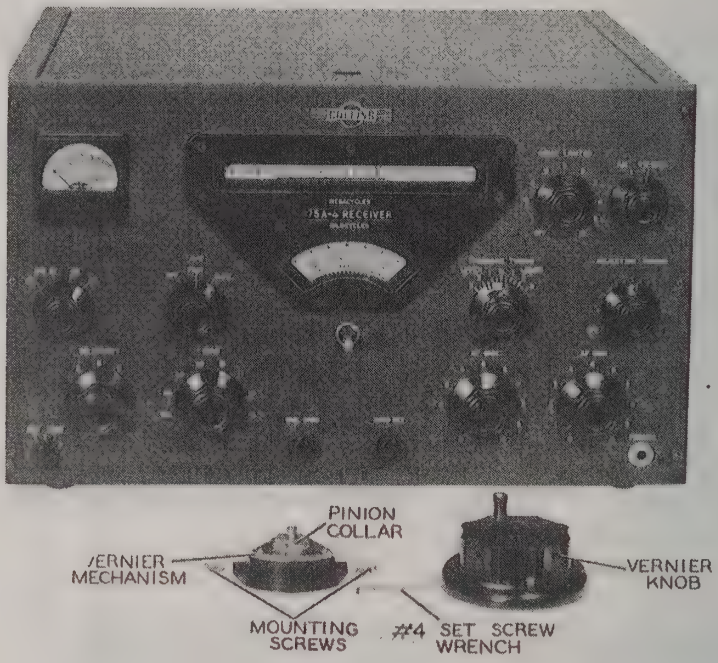

Figure 3. Step 2

3. Figure 3 shows the parts necessary to install the new tuning knob. Arrange these parts as shown and set all others aside.

4. Refer to figure 4. Enter the tuning shaft into the ring gear hole and slide the vernier mechanism back to where the tuning shaft is about to enter the frame bearing. Carefully press the frame downward until the bearing in the frame is aligned with the tuning shaft then slide the frame onto the shaft. (Because of the antibacklash spring, the frame bearing will not ordinarily be aligned with the tuning shaft until a small amount of pressure is exerted.) Slide the assembly back on the tuning shaft and align the two mounting holes with the old bearing plate mounting holes. Insert the bearing plate mounting screws which were saved and tighten them. Slide the ring gear back until there is about 1/32 inch clearance between the back of the ring gear and the frame casting. If the ring gear is not positioned correctly, it will not clear the shim washer located behind the pinion gear and backlash may result. Tighten the two shaft setscrews. Turn the ring through several revolutions to make sure it does not rub anywhere.

5. Place the new tuning knob onto the knob shaft (shown in figure 4). Slide the knob on the shaft as far as it will go and tighten the two setscrews.

6. Release the DIAL DRAG knob. It is no longer used.

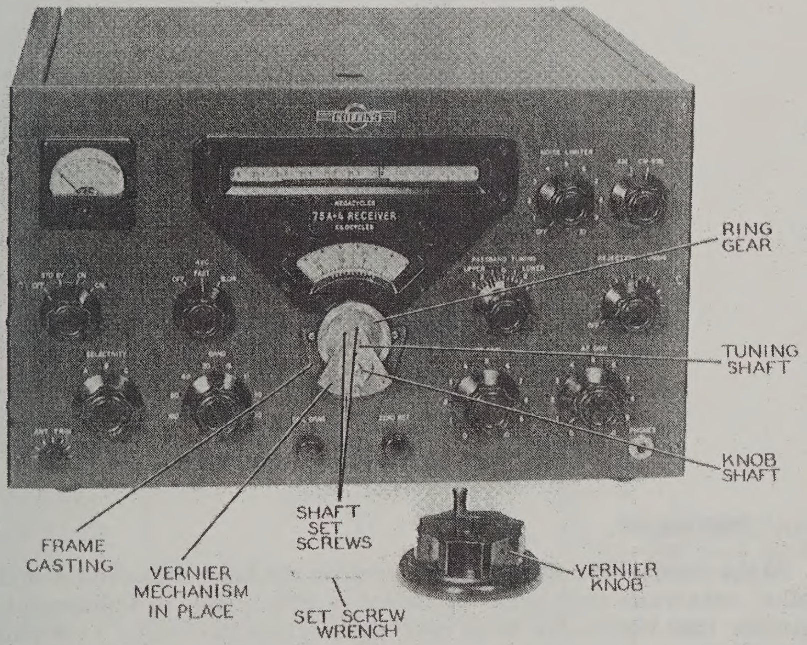

Figure 4. Step 3

III. MAINTENANCE

1. LUBRICATION.

If, at any time, the knob loses its smoothness or begins to feel toothy, there is a possibility that the lubricant has become dirty or dried out. Remove the entire assembly from the receiver and wash the vernier mechanism in carbon tetrachloride or gasoline. Clean out the back of the tuning knob with a clean lintless cloth. Coat the ring gear teeth with a thin film of light grease such as Lubriplate, or Vaseline. Disassemble the pinion from the pinion collar by releasing the two collar setscrews and withdrawing the pinion shaft. Wash the parts in carbon tetrachloride then reassemble after first coating them with the light grease. Squeeze the pinion and the pinion collar together and tighten the setscrews. Assemble the remainder of the knob.

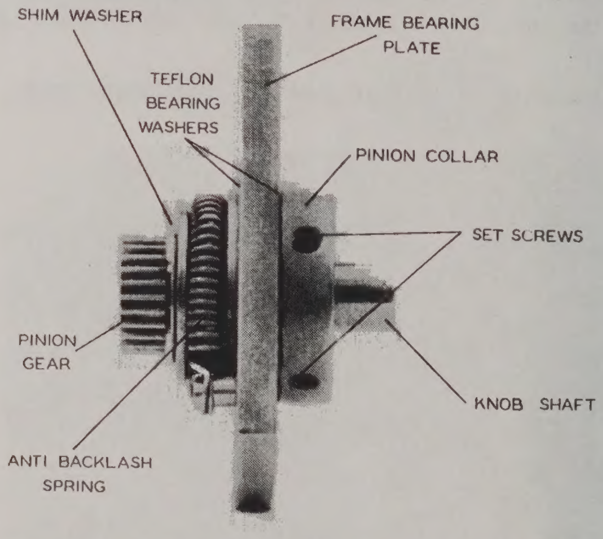

Figure 5. Vernier Mechanism, Right Side View

2. ADJUSTMENT.

If the tuning knob feels wobbly, remove the knob, release the pinion collar setscrews (see figure 5) and squeeze the pinion and pinion collar together then tighten the setscrews and replace the knob. If the tuning knob binds as it is rotated, remove the knob, release the pinion collar setscrews (see figure 5) and loosen the pinion and pinion collar. Tighten the setscrews and replace the knob.

Continue adjusting the pinion and pinion collar until the knob turns freely with a minimum of wobble.

The main dial should not move when the BFO control is rotated. If it does, tighten the pinion and pinion collar as described above.

The Vernier Tuning Knob assembled and installed on a 75A-4 Receiver is shown in figure 1.

Use the same procedure for installing the Vernier Tuning Knob on a Collins Type KWS-1 Transmitter. For other types of equipment, refer to figure 6 for mounting dimensions and drilling information.

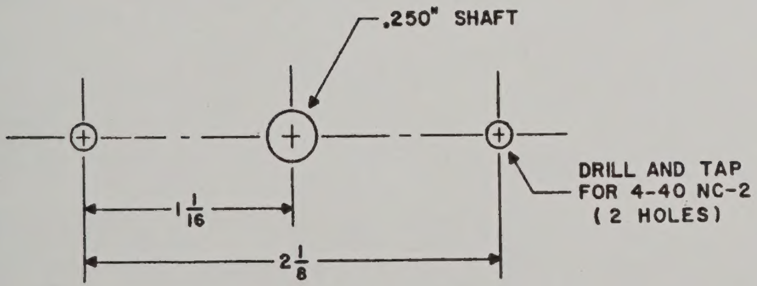

Figure 6. Mounting Dimensions and Drilling Template

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261 Madison Avenue, NEW YORK 16
1930 Hi-Line Drive, DALLAS 2
2700 W. Olive Avenue, BURBANK
Dogwood Road, Fountain City, KNOXVILLE
~~222 W. Pensacola Street, TALLAHASSEE~~

COLLINS RADIO COMPANY OF CANADA, LTD.
~~74 Sparks St.,~~ OTTAWA, ONTARIO